

APPENDIX D. DETAILED TASK ANALYSIS

This section gathers all the private vehicle scenarios and the commercial vehicle scenarios that were chosen as illustrators of particular characteristics for the task analysis. The purpose of this section is to illustrate the task breakdown for each individual scenario, so that it is easier to integrate the nature of the interactions between the ATE-related tasks and the driving-related tasks.

To facilitate the reader's understanding, this section has been divided into two major portions: (1) all the private vehicle scenarios, and (2) all the commercial vehicle scenarios. For each scenario, the following information is provided: (1) a summary of the scenario's purpose and a brief description of the systems and functions used, (2) a graphical representation of the function interactions, (3) an Operational Sequence Diagram (OSD) of the scenario, and (4) a task breakdown summarizing the driver's activities believed to occur during the scenario.

Assumption. In some of these scenarios, it is assumed that some of the pre-drive activities have already been completed due to the nature of the scenario's environmental conditions. However, the elements pertaining to ATIS may be included if they will be used as part of the scenario's conditions. In addition, in some cases, the scenarios do not describe the driving to destination and, as a consequence, the driving activities have not been included.

PRIVATE SCENARIOS

Scenario P6

<u>Purpose</u>	To show the centrality of pre-drive route and destination selection.
<u>Summary</u>	A driver is on an extended driving vacation. He has stopped approximately 50 mi (80.5 km) from his destination to review motel options for the evening at his destination point. He accesses the IMSIS directory for the town he will be staying in, reviews several alternative motels, and selects three that are located in one specific area and that look interesting. Before proceeding toward his destination, he makes a reservation using ATIS.
<u>Function Interaction Diagram</u>	See figure 29.
<u>Operational Sequence Diagram</u>	See figure 30.
<u>Task Characterization</u>	See table 55.

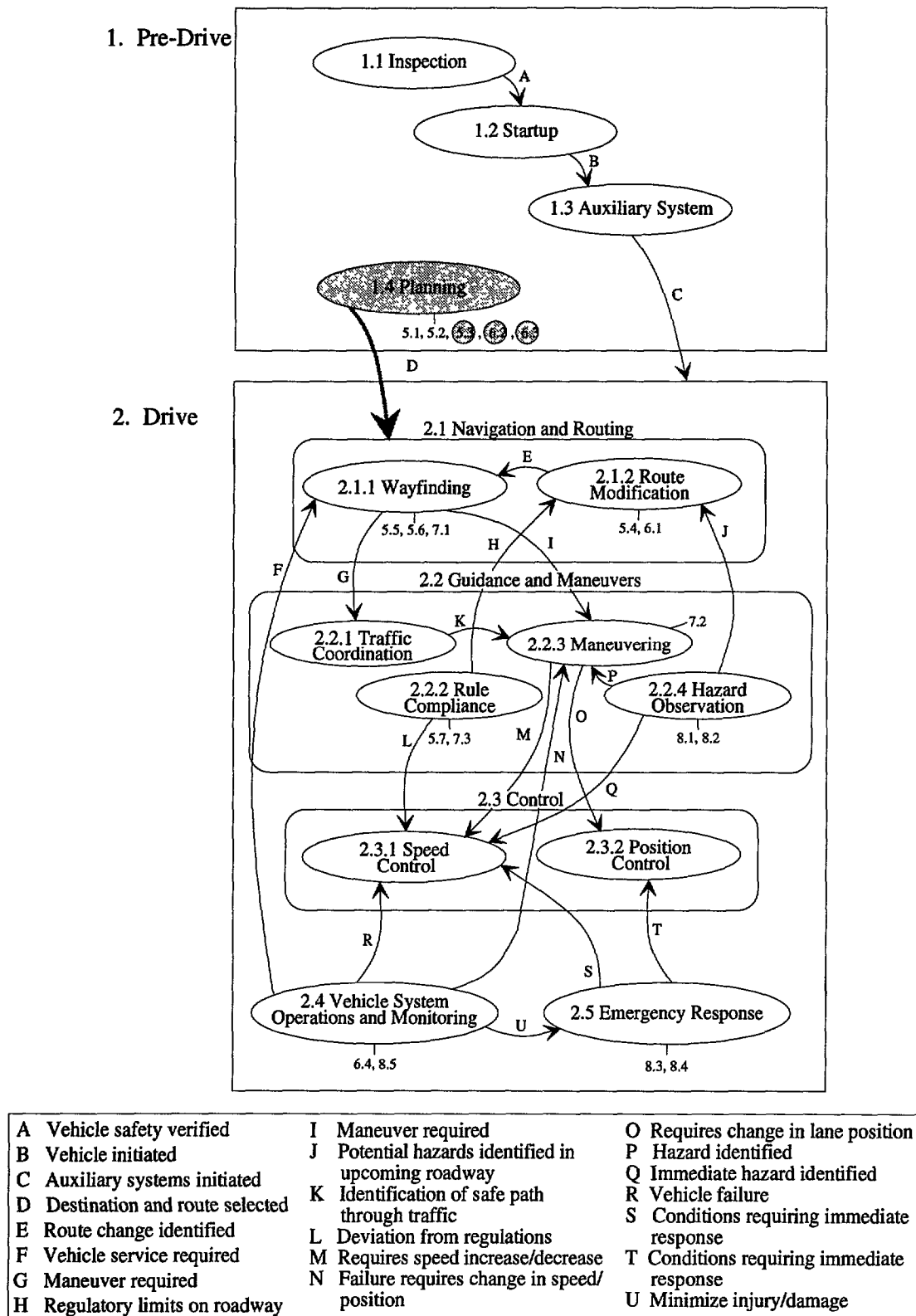


Figure 29. Function interaction diagram for Scenario P6.

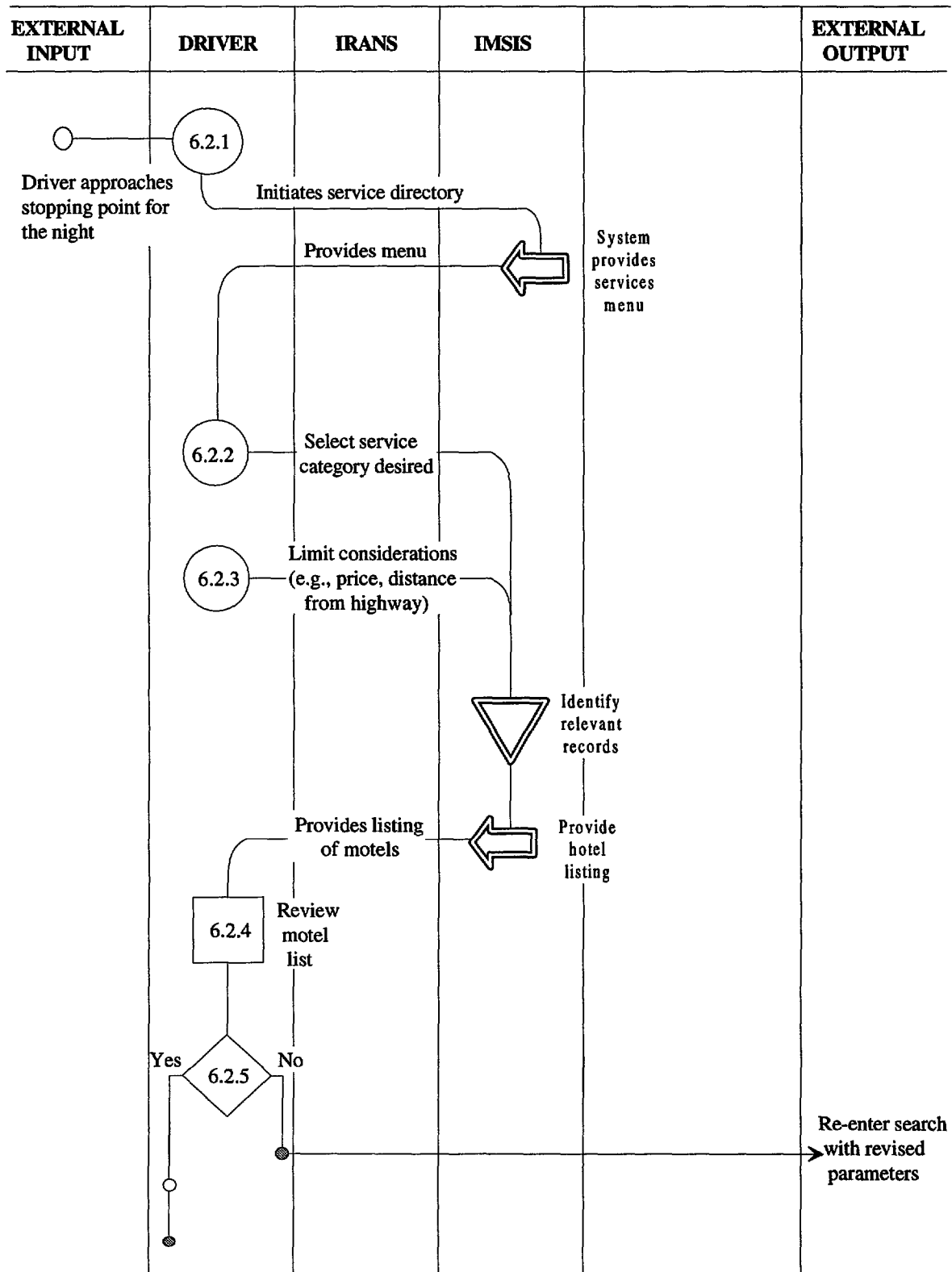


Figure 30. Operational sequence diagram for Scenario P6.

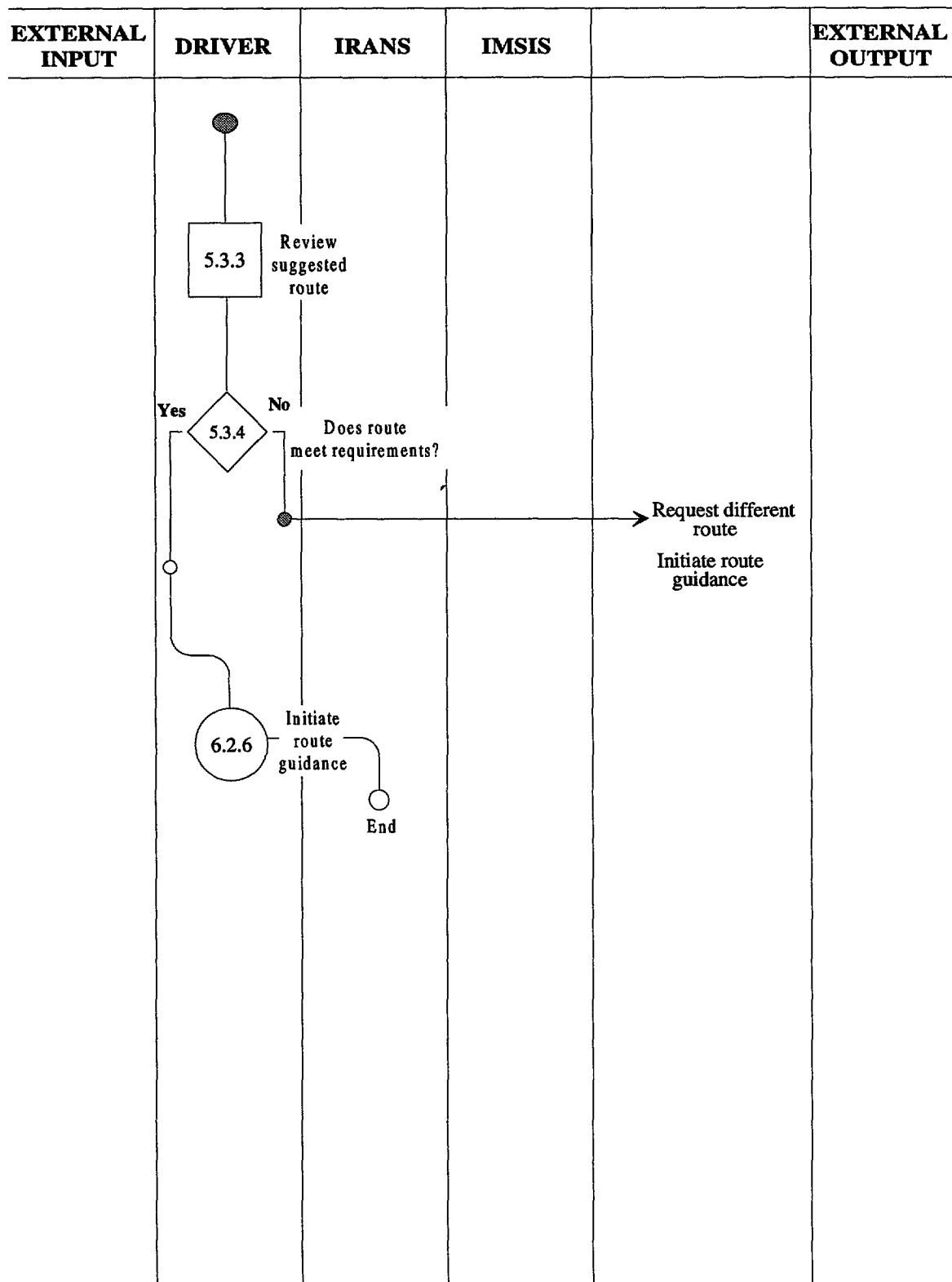


Figure 30. Operational sequence diagram for Scenario P6 (continued).

Table 55. Task characterization of Scenario P6.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
6.2.1	DRIVER INITIATES SERVICES/ ATTRACTIONS DIRECTORY	Make a system ready to use	Goal initiation	CONTROL	Requirements don't exceed driver's response capabilities.	
UNCODED SYSTEM ACTIONS						
6.2.2	SELECT CLASS OF SERVICES DESIRED	Limit system considerations	System demand	DECIDE/SELECT	Adequate information for user to predict outcome.	
6.2.3	SELECT PARAMETERS FOR CLASS OF SERVICES	Limit system considerations	System demand	CODE	Motor actions within human capabilities. Input requirements compatible with knowledge. Input requirements direct.	E.g., cost of room, location, amenities. Special services required.
UNCODED SYSTEM ACTIONS						
6.2.4	REVIEW LISTING	Obtain system information	Completion of previous step	SEARCH	Information presented must be consistent with user's knowledge base.	

Table 55. Task characterization of Scenario P6.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
6.2.5	SELECT ITEM FROM LISTING	Approve system output and initiate next step	Completion of previous step	CONTROL	Requirements don't exceed driver's response capabilities. System provides indication that the system is responding to input.	
6.3.2	INITIATE DESTINATION COORDINATION	Invoke system operation	System demand	CONTROL	System provides indication that the system is responding to input.	
UNCODED SYSTEM ACTIONS						
5.3.2.1	DESTINATION	Provide system information	System demand	CODE	Input requirements directly.	Transfer action from IMSIS to IRANS.
5.3.2.2	ROUTE PARAMETERS	Limit system considerations	System demand	CODE	Input requirements compatible with knowledge.	May be automated function or limited by system design.
UNCODED SYSTEM ACTIONS						
5.3.3	REVIEW RECOMMENDED ROUTE	Environmental change	Completion of previous step	INTERPRET	Information presented must be consistent with user's knowledge base. Information presented must be consistent with user's understanding of system goals.	

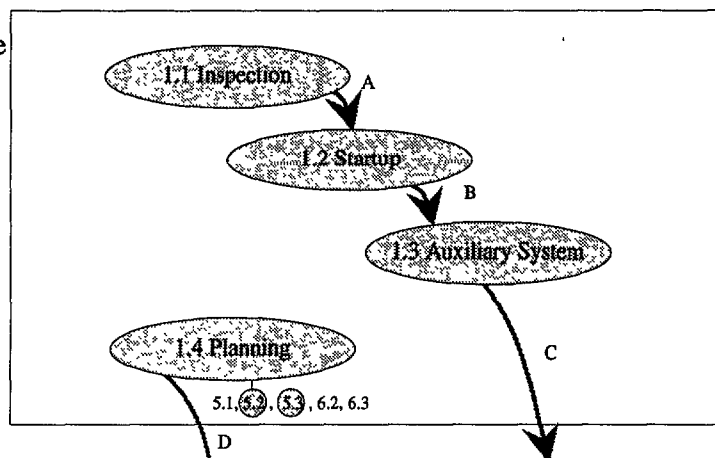
Table 55. Task characterization of Scenario P6.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.3.4	DECIDE IF ROUTE IS ACCEPTABLE	Verify output meets expectations	Completion of previous step	DECIDE/SELECT	Adequate information for user to predict outcome.	
6.2.6	INITIATE ROUTE GUIDANCE TO SELECTED ITEM	Invoke system operation	Change of goals	CONTROL	Requirements don't exceed driver's response capabilities. System provides indication that the system is responding to input.	
END OF SCENARIO						

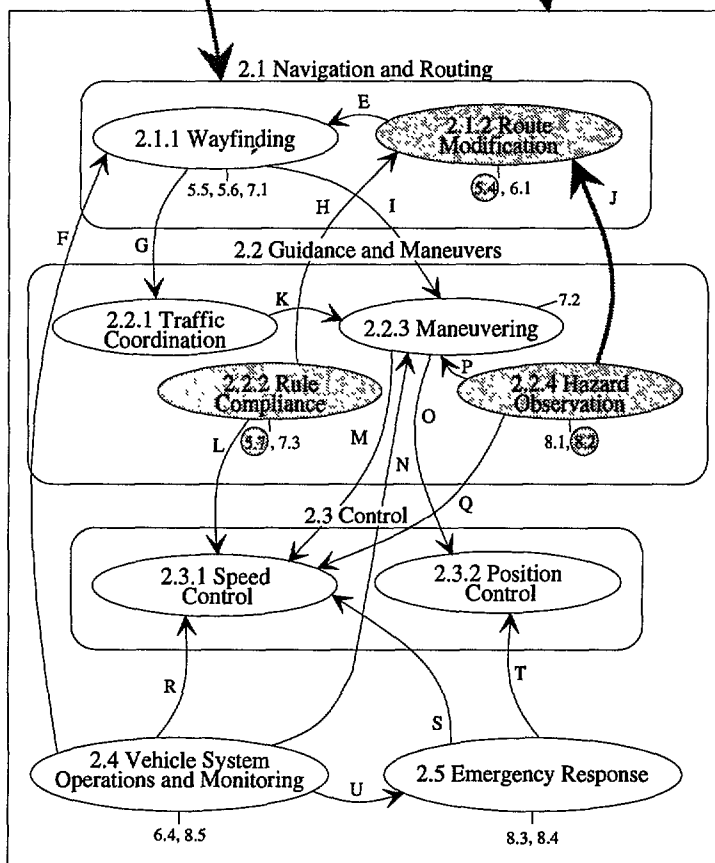
Scenario P14

<u>Purpose</u>	To illustrate a grouping of functional characteristics from Cluster 1 (5.1, 5.2, 5.3, 5.4, 5.6, 7.1, and 8.2).
<u>Summary</u>	<p>A driver commutes between her home and the office. The commute requires coordination between three different modes of transportation. She drives the first 10 mi (16.1 km) and then has to decide between taking the ferry across the Bay or driving around the Bay Area. Once she is on the other side of the Bay, she has to drive for another 5 mi (8.0 km) to a park-and-ride lot where she takes a bus to the office. However, she can choose to reject the bus option and drive an additional 10 mi (16.1 km) if the traffic is light. It is a cold winter day and the roads are icy. She needs to get to work in the shortest amount of time possible. She uses her ATIS to plan her trip to the office and to coordinate the travel between the different modes of transportation. After taking the ferry and paying the toll, and while traveling to the bus stop, her ATIS informs her of icy conditions on the road and of bus delays. She selects an alternate route and continues her drive to work.</p>
<u>Function Interaction Diagram</u>	See figure 31.
<u>Operational Sequence Diagram</u>	See figure 32.
<u>Task Characterization</u>	See table 56.

1. Pre-Drive



2. Drive



A Vehicle safety verified	I Maneuver required	O Requires change in lane position
B Vehicle initiated	J Potential hazards identified in upcoming roadway	P Hazard identified
C Auxiliary systems initiated	K Identification of safe path through traffic	Q Immediate hazard identified
D Destination and route selected	L Deviation from regulations	R Vehicle failure
E Route change identified	M Requires speed increase/decrease	S Conditions requiring immediate response
F Vehicle service required	N Failure requires change in speed/position	T Conditions requiring immediate response
G Maneuver required		U Minimize injury/damage
H Regulatory limits on roadway		

Figure 31. Function interaction diagram for Scenario P14.

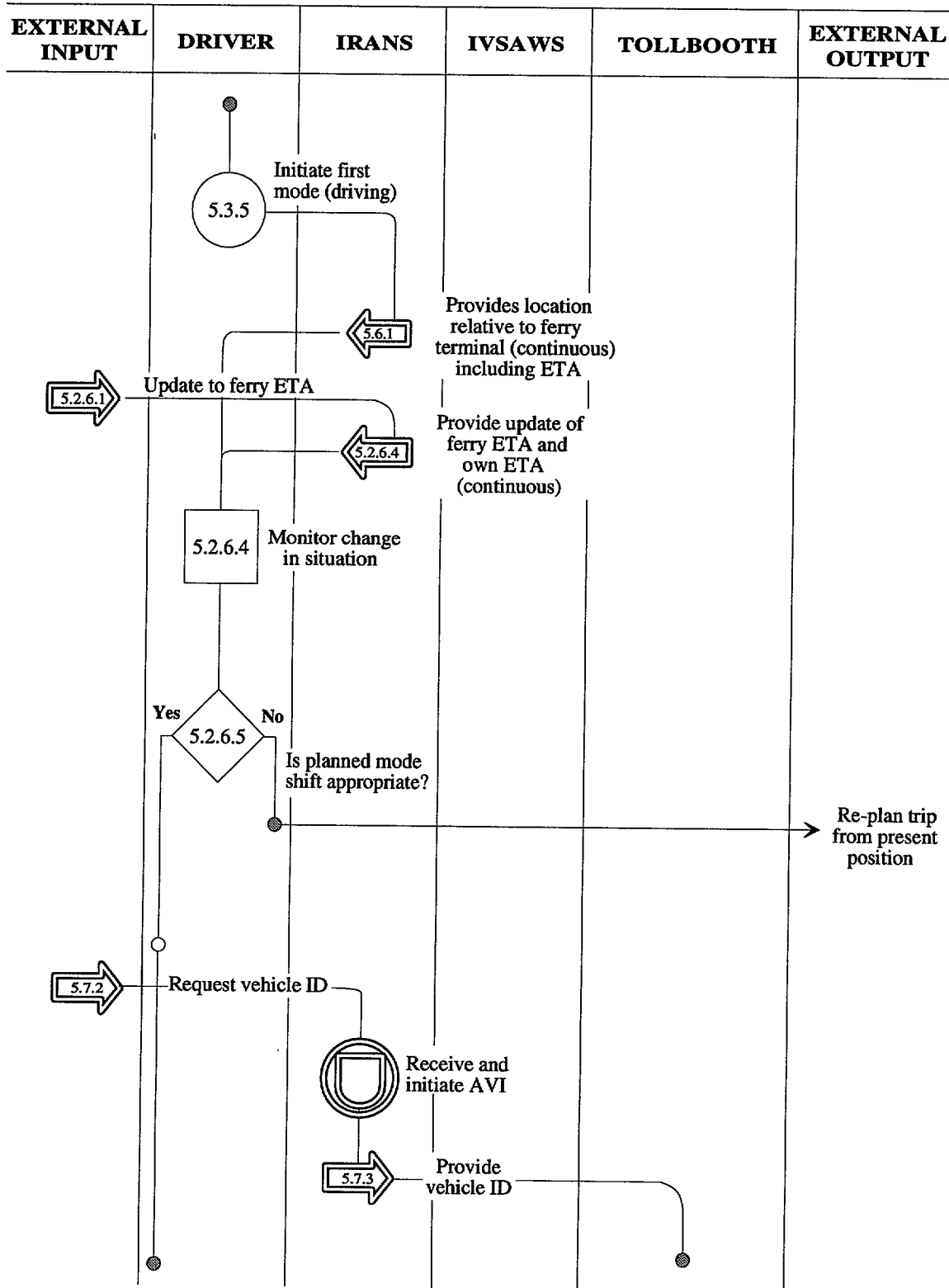


Figure 32. Operational sequence diagram for Scenario P14 (continued).

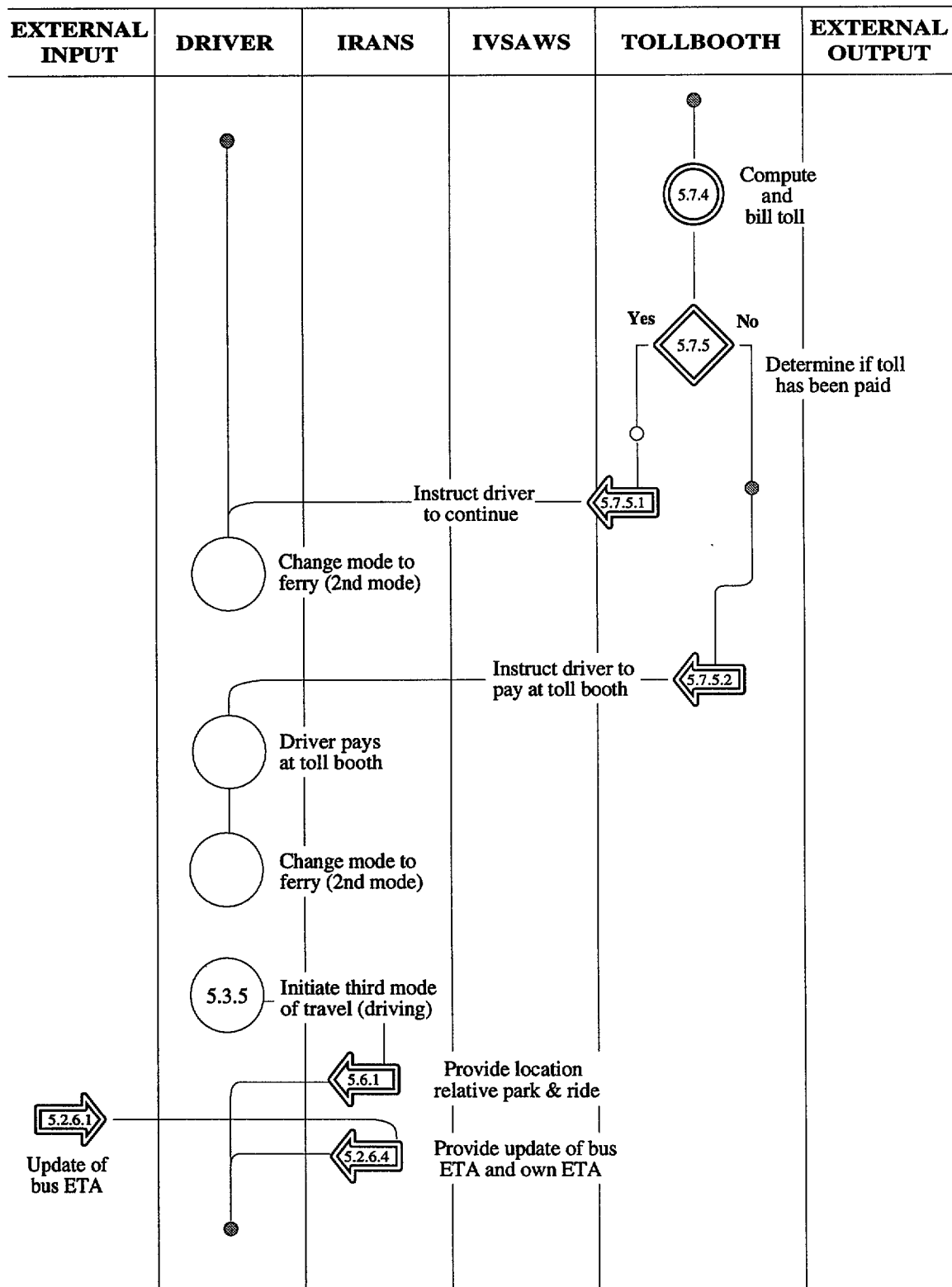


Figure 32. Operational sequence diagram for Scenario P14 (continued).

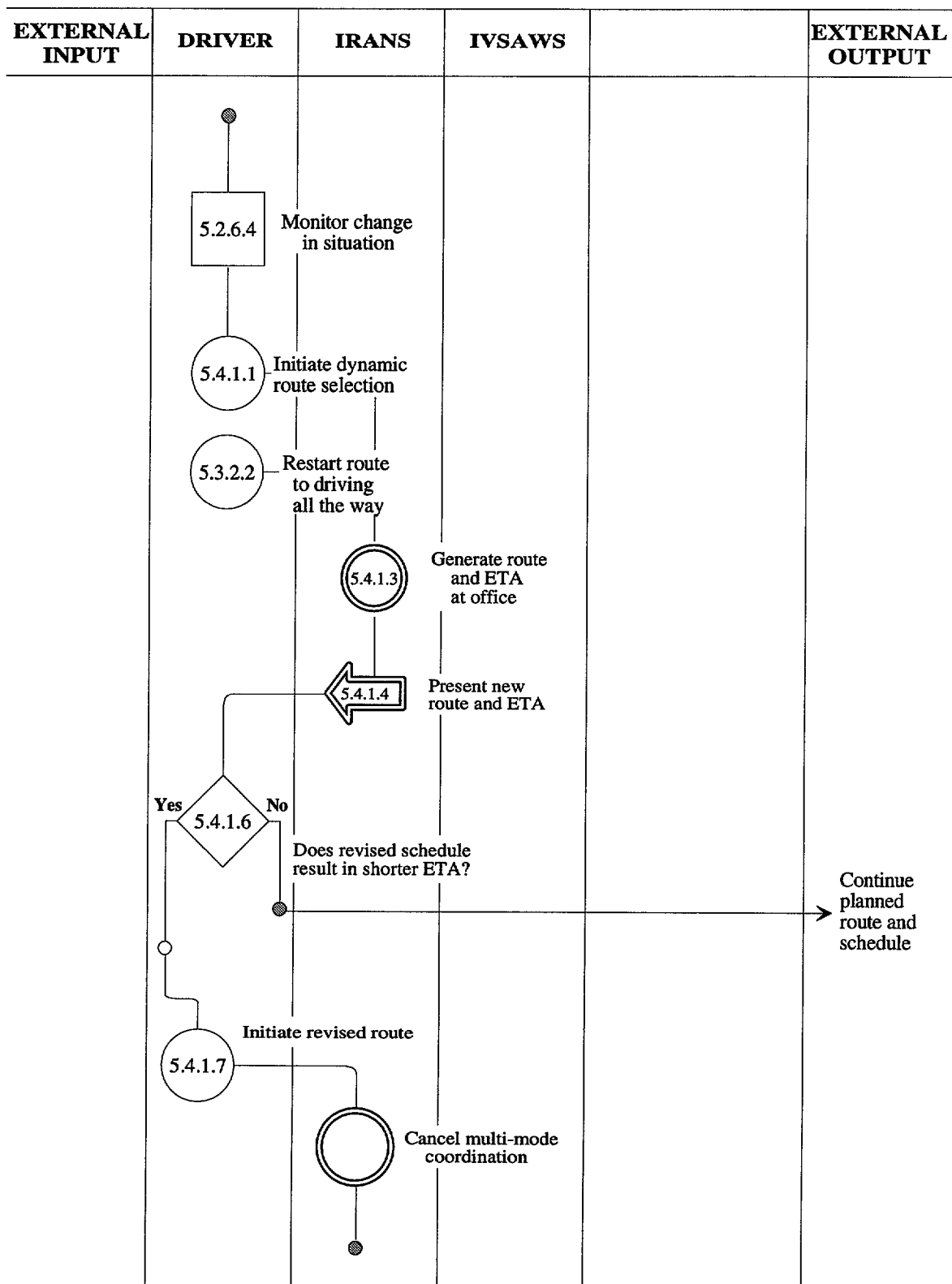


Figure 32. Operational sequence diagram for Scenario P14 (continued).

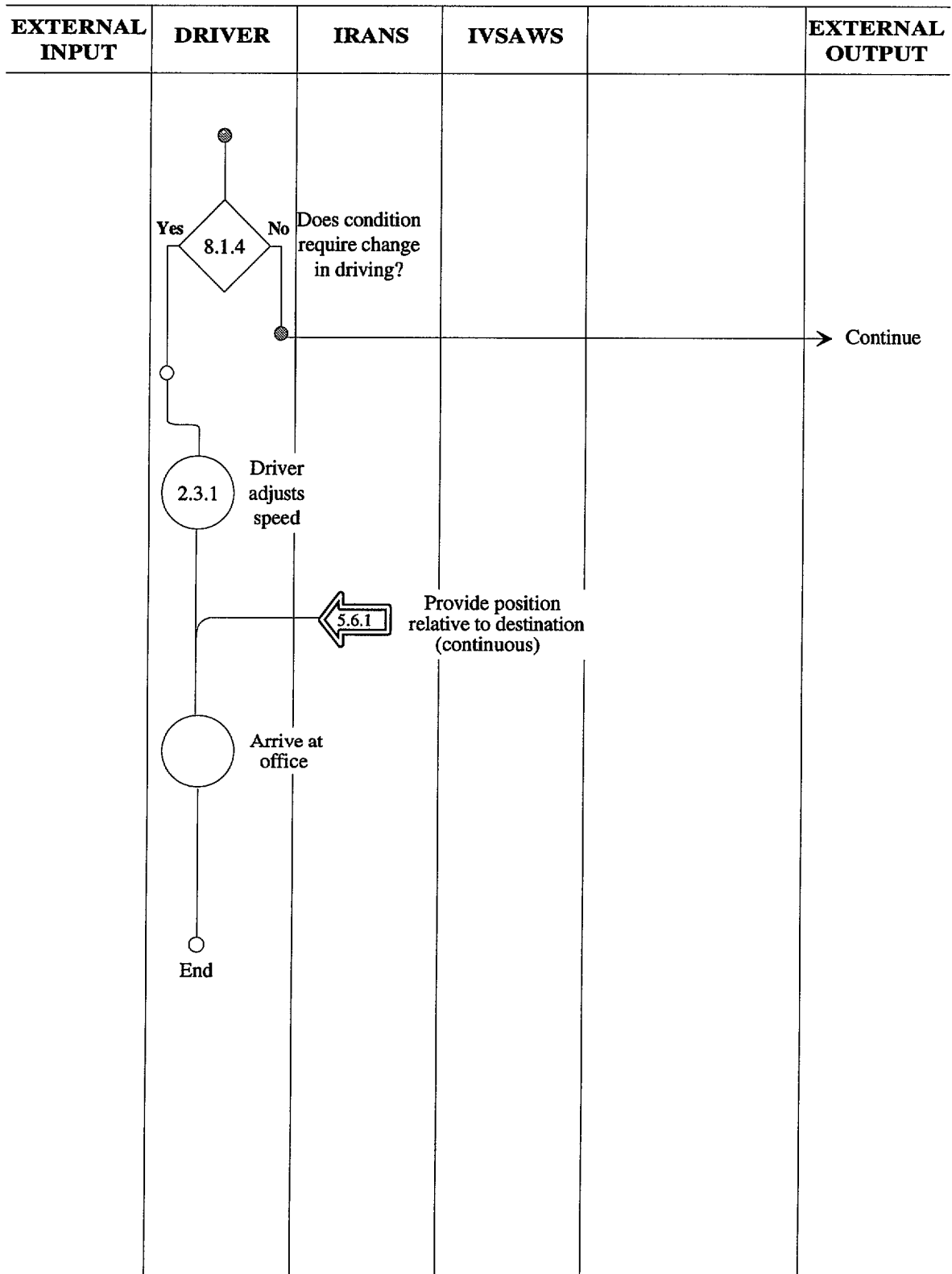


Figure 32. Operational sequence diagram for Scenario P14 (continued).

Table 56. Task characterization of Scenario P14.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
5.3.2.1.1	ENTER DESTINATION	Provide system information	System demand	CODE	Motor actions within human capabilities. Input requirements directly.	Commonly used destination might be in pre-developed route menu.
5.2.2	ENTER CONSTRAINTS	Provide system information	System demand	CODE	Motor actions within human capabilities. Input requirements directly.	May be preselected preference information.
5.2.1	ACQUIRE CONSTRAINTS	Obtain environment information	System demand	IDENTIFY		May be done in combination with automated transfer of information (e.g., updated bus and train schedules). Automatic System Action.
UNCODED SYSTEM ACTIONS						
5.2.6.4	SYSTEM PROPOSES NEW MULTI-MODE SCHEDULE	Narrow user considerations	Completion of previous step	INTERPRET	Information presented must be consistent with user's knowledge base.	

Table 56. Task characterization of Scenario P14.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.2.6.5	DETERMINE IF NEW MULTI-MODE SCHEDULE WILL MEET REQUIREMENTS	Evaluate system recommendation	System demand	TEST	Recommendations in appropriate detail to identify compatibility with constraints.	
5.3.5	INITIATE SYSTEM APPROVAL	Approve system output and initiate next step	Completion of previous step	CONTROL	Requirements don't exceed driver's response capabilities.	Transfer task from IRANS planning to multi-mode coordination.
5.6.1	SYSTEM PROVIDES NAVIGATION INFORMATION	Obtain system information	Completion of previous step	CODE		Automatic system action. This scenario assumes use of IRANS for navigation, but not guidance.
5.2.6.1	SYSTEM UPDATE OF ARRIVALTIMES	Provide system information	Environmental change	MONITOR		(E.g., arrival time of current mode, arrival time of next mode.) Automatic system action.
5.2.6.4	SYSTEM PROPOSES NEW MULTI-MODE SCHEDULE	Narrow user considerations	Completion of previous step	CODE		Automatic system function.

Table 56. Task characterization of Scenario P14.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.2.6.4	SYSTEM PROPOSES NEW MULTI-MODE SCHEDULE	Narrow user considerations	Completion of previous step	CODE		
5.2.6.5	DETERMINE IF NEW MULTI-MODE SCHEDULE WILL MEET REQUIREMENTS	Evaluate system recommendation	System demand	TEST	Recommendations in appropriate detail to identify compatibility with constraints. Level of detail does not increase workload.	
5.7.2	SYSTEM QUERIES VEHICLE FOR TOLL TAG OR AVI	Invoke system operation	Completion of previous step	SEARCH		Automatic system action.
UNCODED SYSTEM ACTIONS						
5.7.3	SYSTEM IDENTIFIES VEHICLE	Involve system operation	Completion of previous step	CODE		Automatic system action.
5.7.4	SYSTEM INITIATES AUTOMATIC BILLING OR DEDUCTS TOLL	Invoke system operation	Completion of previous step	CONTROL		Automatic system action.

Table 56. Task characterization of Scenario P14.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.7.5	SYSTEM DETERMINES IF TOLL PAYMENT. IS APPROPRIATE	Invoke system operation	Completion of previous step	DECIDE/SELECT		Automatic system action.
.7.5.1	IF YES, INDICATE TO DRIVER THAT HE/SHE IS FREE TO CONTINUE	Obtain system information	Completion of previous step	CODE		Conditional outcome of 5.7.5. Automatic system action.
.7.5.2	IF NO, INDICATE DRIVER MUST STOP AT TOLL BOOTH	Obtain system information	Completion of previous step	CODE		Conditional outcome of 5.7.5. automatic system action.
UNCODED DRIVER ACTIONS						
.3.5	INITIATE SYSTEM APPROVAL	Approve system output and initiate next step	Completion of previous step	CONTROL	Requirements don't exceed driver's response capabilities. System provides indication that the system is responding to input.	
.6.1	SYSTEM PROVIDES NAVIGATION INFORMATION	Obtain system information	Completion of previous step	CODE		Automatic system action.

Table 56. Task characterization of Scenario P14.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.2.6.1	SYSTEM UPDATE OF ARRIVAL TIMES	Provide system information	Environmental change	MONITOR		(E.g., arrival time of current mode, arrival time of next mode.) Automatic system action.
5.2.6.4	SYSTEM PROPOSES NEW MULTI-MODE SCHEDULE	Narrow user considerations	Completion of previous step	CODE		Automatic system action.
5.4.1.1	DRIVER RECOGNIZES NEED FOR REVISED ROUTE	Modify system operation	Change of goals	INTERPRET	Information presented must be consistent with user's knowledge base. Information presented must be consistent with user's understanding of system goals.	
5.3.2.2	ROUTE PARAMETERS	Limit system considerations	System demand	CODE	Input requirements directly.	May be automated function or limited by system design.
5.4.1.3	SYSTEM COMPUTES NEW ROUTE	Invoke system operation	Completion of previous step	COMPUTE		Automatic system action.
5.4.1.4	SYSTEM PRESENTS REVISED ROUTE	Obtain system information	Completion of previous step	CODE		Automatic system action.

Table 56. Task characterization of Scenario P14.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.4.1.6	DECIDES IF RECOMMENDED ROUTE IS SATISFACTORY	Verify output meets expectations	Completion of previous step	DECIDE/SELECT	Adequate information for user to predict outcome. Recommendations consistent with driver's experience.	
5.4.1.7	INITIATE SYSTEM APPROVAL	Invoke system operation	Goal initiation	CONTROL	System provides indication of responding to system input.	
UNCODED SYSTEM ACTIONS						
5.6.1	SYSTEM PROVIDES NAVIGATION INFORMATION	Obtain system information	Completion of previous step	CODE		Automatic system action.
5.6.2	DRIVER OBSERVES NAVIGATION INFORMATION	Understand system/environmental information	Completion of previous step	INTERPRET	Information presented must be consistent with user's knowledge base.	
UNCODED SYSTEM ACTIONS						
8.1.1	SYSTEM DETECTS HAZARD NOTIFICATION	Automatic system operation	System demand	DETECT		Automatic system action.

Table 56. Task characterization of Scenario P14.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
8.1.3	SYSTEM PROVIDES INFORMATION ON HAZARD TYPE	Automatic system operation	System demand	CODE		Automatic system action.
2.4.6.4	USE IVSAWS	Invoke system operation	Goal initiation	IDENTIFY	Information presented must be consistent with user's knowledge base.	
8.1.4	DRIVER TAKES APPROPRIATE ACTION IN RESPONSE TO HAZARD	Understand system/environmental information	Change of goals	DECIDE/SELECT	Recommendations consistent with driver's experience.	
2.3.1	SPEED CONTROL	Invoke system operation	Goal initiation	CONTROL	Requirements don't exceed driver's response capabilities.	
5.6.1	SYSTEM PROVIDES NAVIGATION INFORMATION	Obtain system information	Completion of previous step	CODE		Automatic system action on demand or continuous.
END OF SCENARIO						

Scenario P22

Purpose To illustrate a grouping of the functional characteristics found in Cluster 2 (6.2, 8.1, 8.3, 8.4, and 8.5).

Summary A driver travels on a secondary road where there are numerous speed changes due to the presence of several small towns. As he is driving, the IVSAWS detects a malfunction of the car's brakes. The driver takes notice of the message and continues to his destination. Later on, he receives another message of road construction ahead. The driver applies the brakes, but it is too late; the car collides with a construction vehicle merging from the side of the road. The ATIS activates the aid request to provide assistance to the driver, who is unconscious.

Function Interaction Diagram See figure 33.

Operational Sequence Diagram See figure 34.

Task Characterization See table 57.

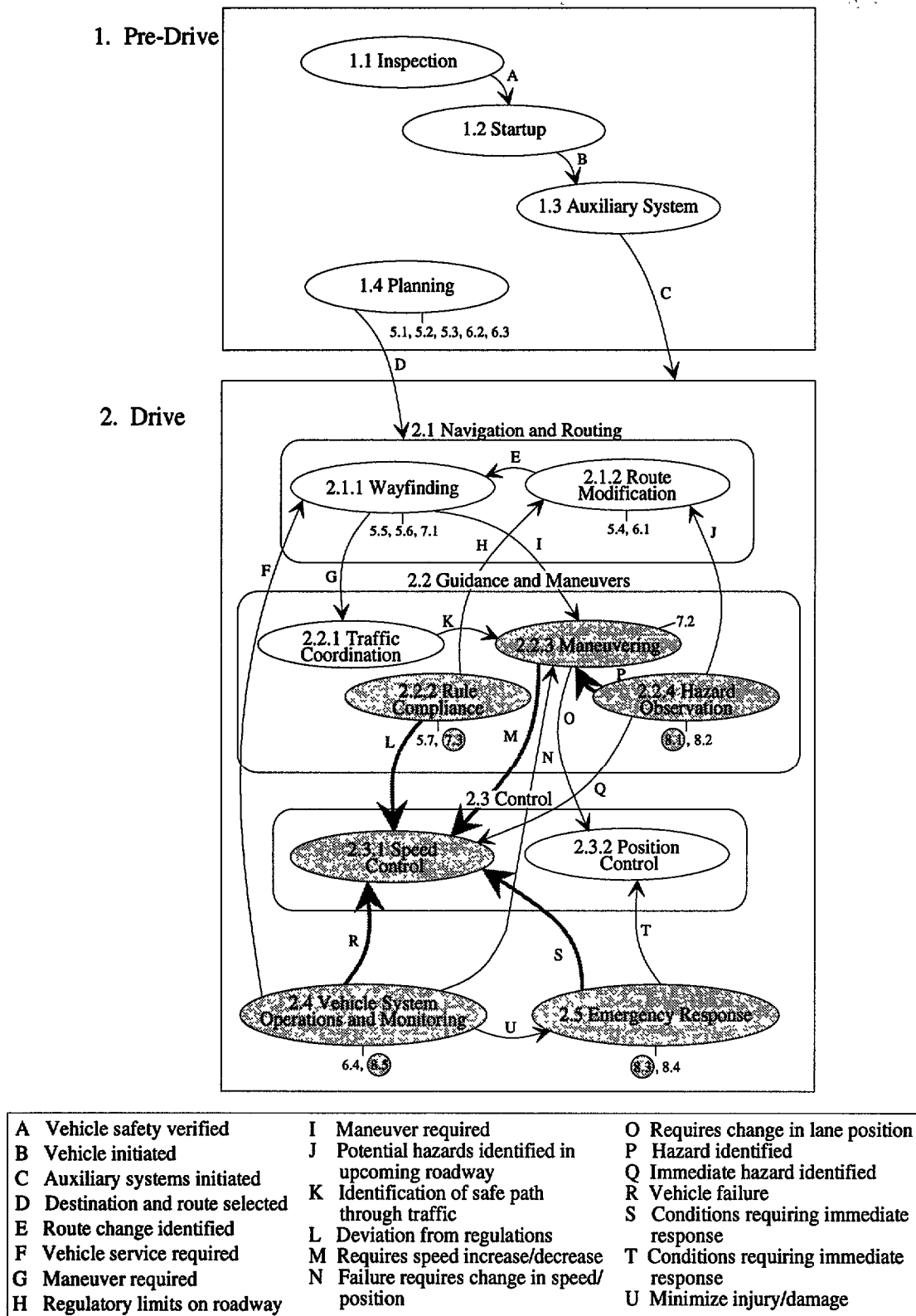


Figure 33. Function interaction diagram for Scenario P22.

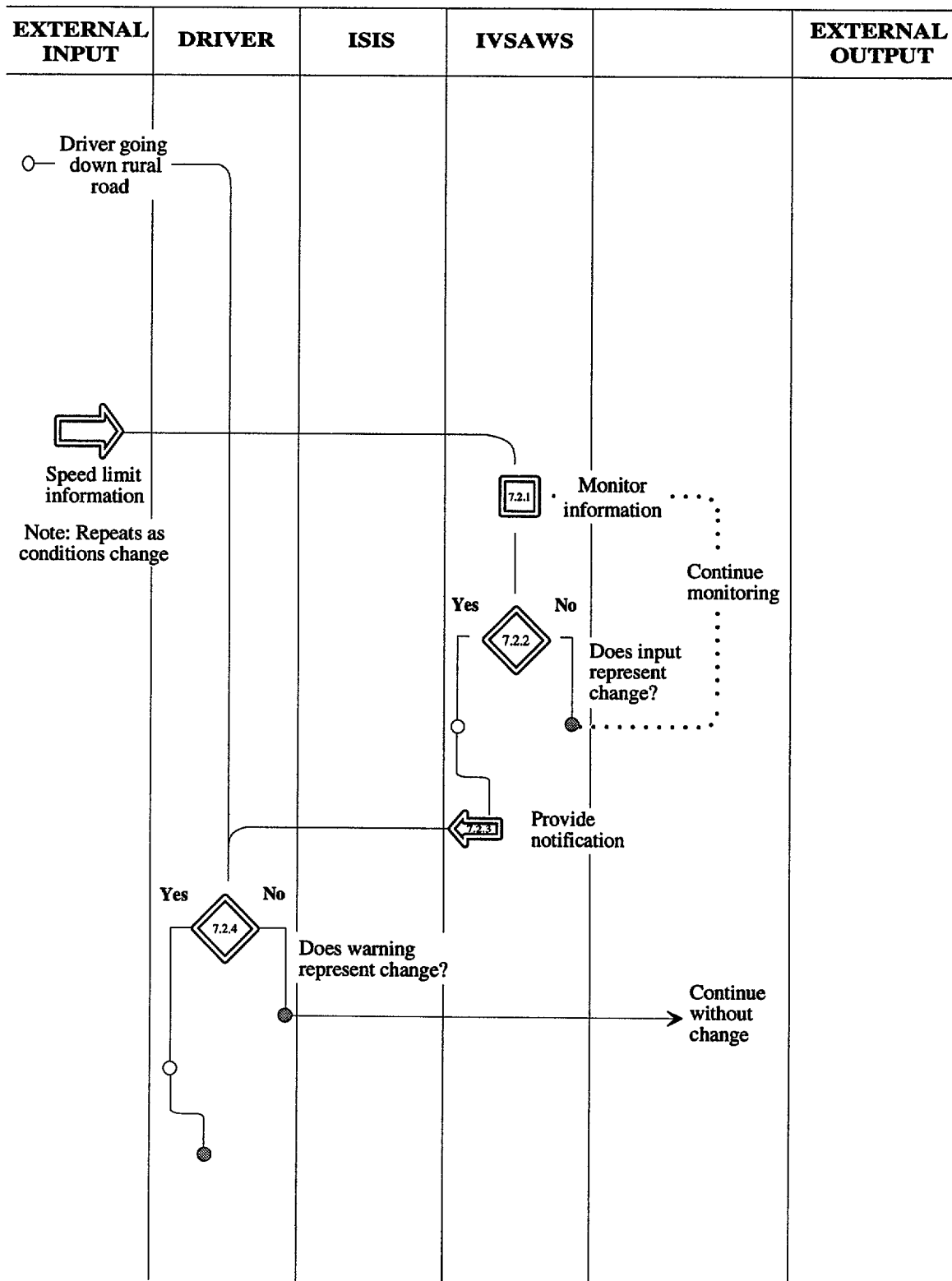


Figure 34. Operational sequence diagram for Scenario P22.

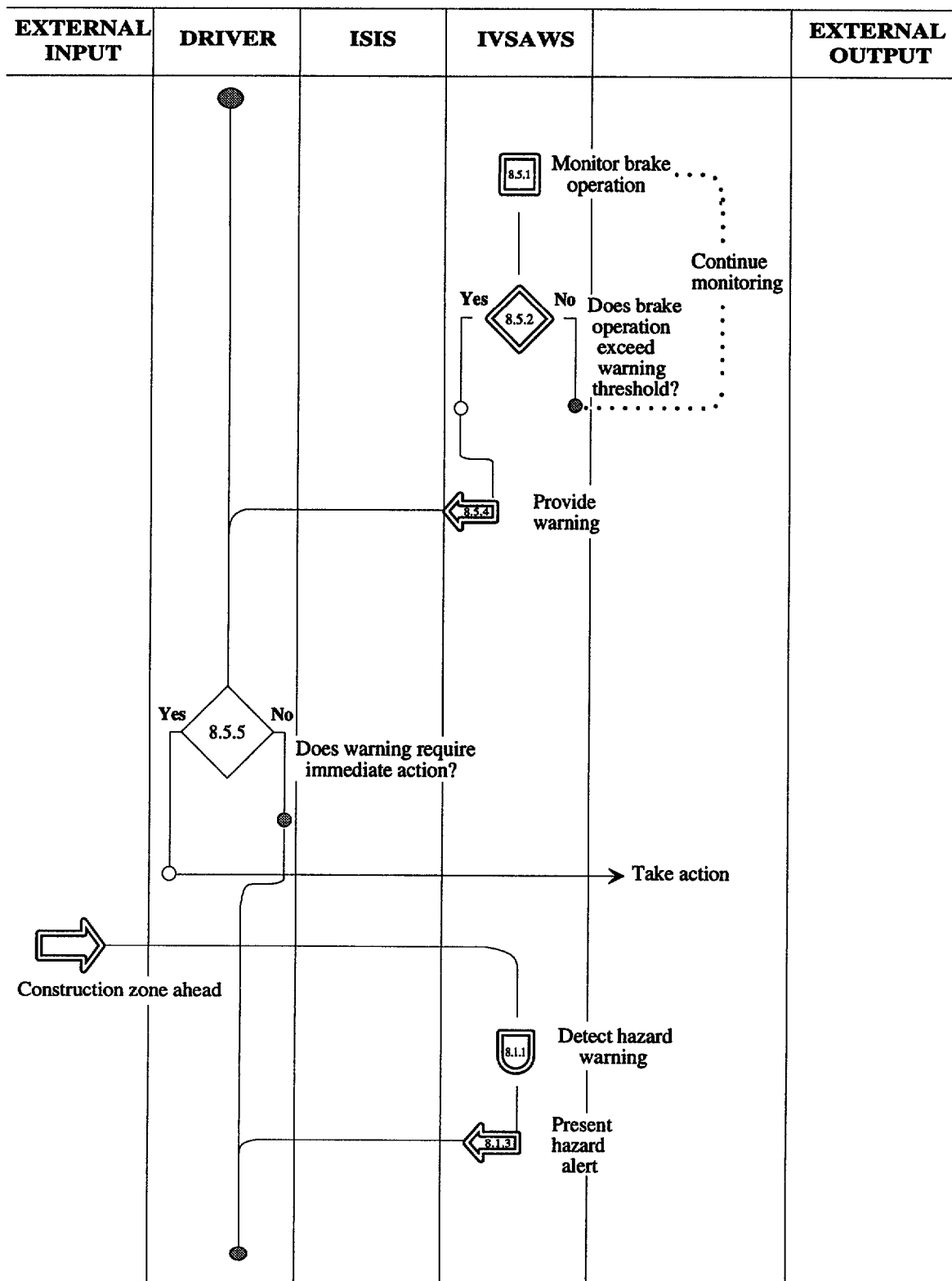


Figure 34. Operational sequence diagram for Scenario P22 (continued).

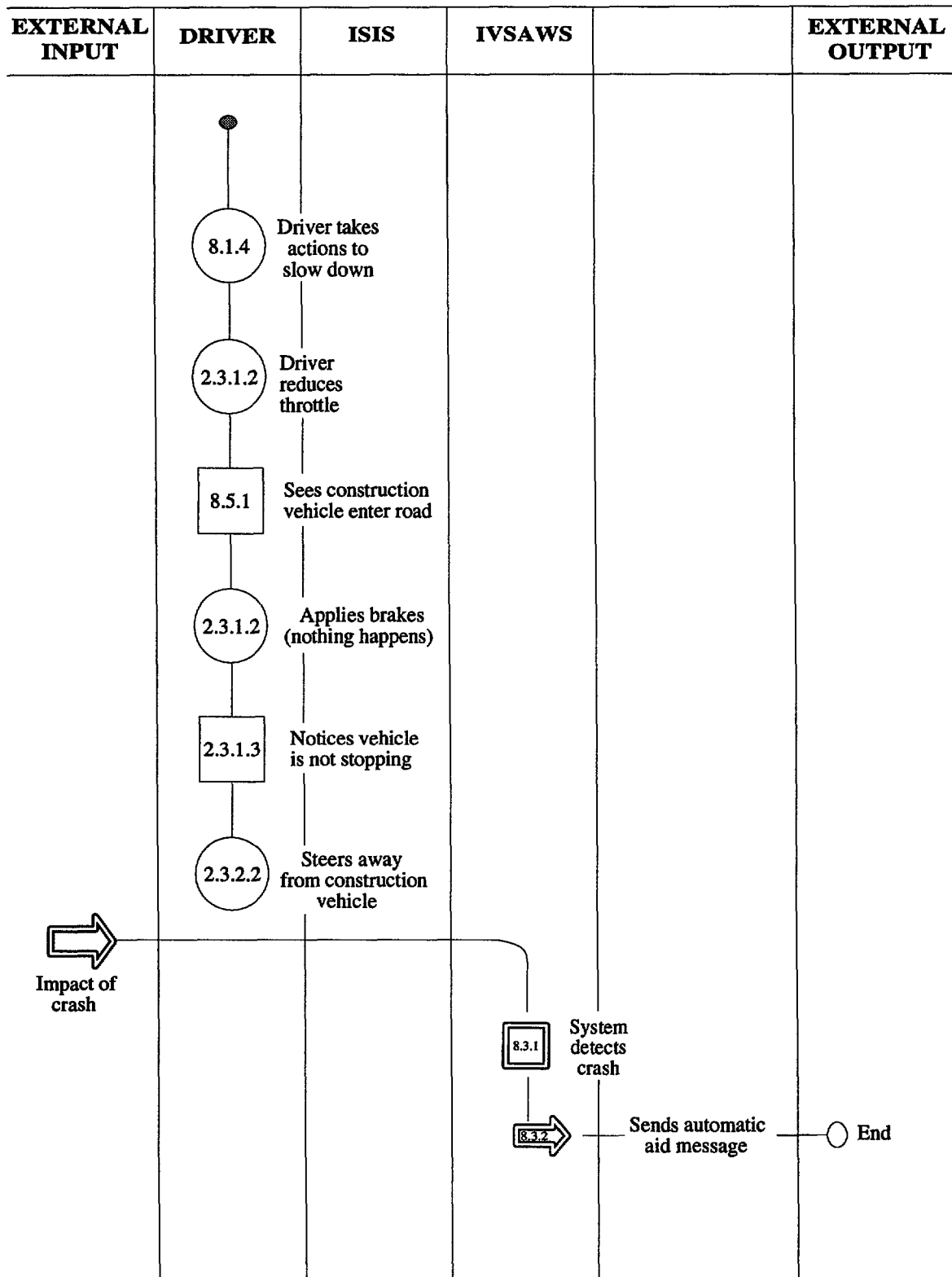


Figure 34. Operational sequence diagram for Scenario P22 (continued).

Table 57. Task characterization of Scenario P22.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
7.2.1	SYSTEM MONITORS ISIS INPUT	Automatic system operation	System demand	DETECT		Automatic system action.
7.2.2	SELECTS ROADWAY SIGN NOTIFICATION INFORMATION	Automatic system operation	System demand	TEST		System matches received signal against preset parameters. Automatic system action.
7.2.3	SYSTEM PRESENTS SELECTED SIGN INFORMATION	Obtain system information	Completion of previous step	CODE		Automatic system action.
7.2.4	DRIVER ACTS ON SIGN INFORMATION AS DESIRED	Understand system/ environmental information	Change of goals	DECIDE/SELECT	Adequate information for user to predict outcome.	
8.5.1	SYSTEM MONITORS VEHICLE PARAMETERS	Maintain safe conditions (general)	System demand	MONITOR		Automatic system action.
8.5.2	SYSTEM DETECTS ABNORMAL CONDITION	Obtain system information	Environmental change	TEST		Automatic system action.

Table 57. Task characterization of Scenario P22.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
8.5.4	SYSTEM PROVIDES DESCRIPTION OF PROBLEM	Obtain system information	Completion of previous step	CODE		
.5.5	DRIVER TARES APPROPRIATE ACTION	Understand system/ environmental information	Change of goals	DECIDE/SELECT		Adequate information for user to predict outcome.
.1.1	SYSTEM DETECTS HAZARD NOTIFICATION	Automatic system operation	System demand	DETECT		Automatic system action.
.1.3	SYSTEM PROVIDES INFORMATION ON HAZARD TYPE	Automatic system operation	System demand	CODE		Automatic system action.
.1.4	DRIVER TARES APPROPRIATE ACTION IN RESPONSE TO HAZARD	Understand system/ environmental information	Change of goals	CONTROL	Requirements don't exceed driver's response capabilities.	

Table 57. Task characterization of Scenario P22.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
2.3.1.2	ADJUST THROTTLE OR BRAKE TO CONTROL SPEED	Modify system operation	System demand	CONTROL	Requirements don't exceed driver's response capabilities.	
2.3.1.3	VERIFY ADJUSTMENT OF SPEED	Verify output meets expectations	Completion of previous step	INTERPRET	Information present must be consistent with user's knowledge base.	
2.3.2.2	ADJUST STEERING WHEEL TO COMPENSATE	Modify system operation	System demand	CONTROL	Requirements don't exceed driver's response capabilities.	
8.3.1	SYSTEM DETECTS EMERGENCY CONDITION	Invoke system operation	System demand	DETECT		Automatic system action.
8.3.2	SYSTEM BROADCASTS EMERGENCY REQUEST	Automatic system operation	Completion of previous step	CONTROL		Automatic system action.
END OF SCENARIO						

Scenario P16

Purpose To illustrate a grouping of functional characteristics from Cluster 3 (6.1, 6.3, and 6.4).

Summary A driver uses ATIS to travel from her hotel to a restaurant on the outskirts of town. While traveling, she receives notification that the engine's temperature is increasing. Fearing engine damage, she pulls off the road. The driver then identifies a service station close by. She requests the assistance of a tow truck and cancels her dinner reservation. She also communicates with her friend to inform her of the misadventure with the vehicle and to ask to be picked up at the service station.

Function Interaction Diagram See figure 35.

Operational Sequence Diagram See figure 36.

Task Characterization See table 58.

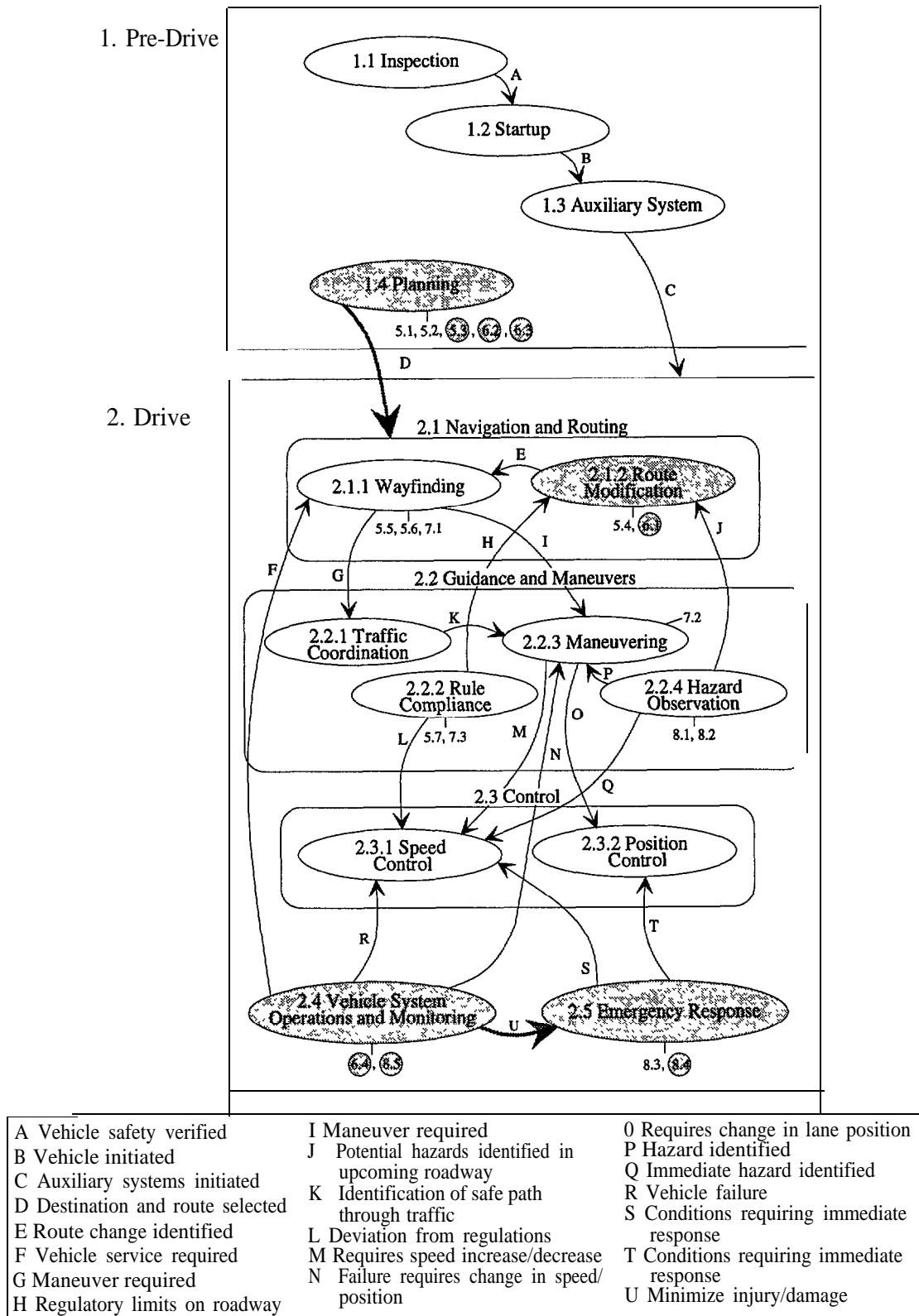


Figure 35. Function interaction diagram for Scenario P16.

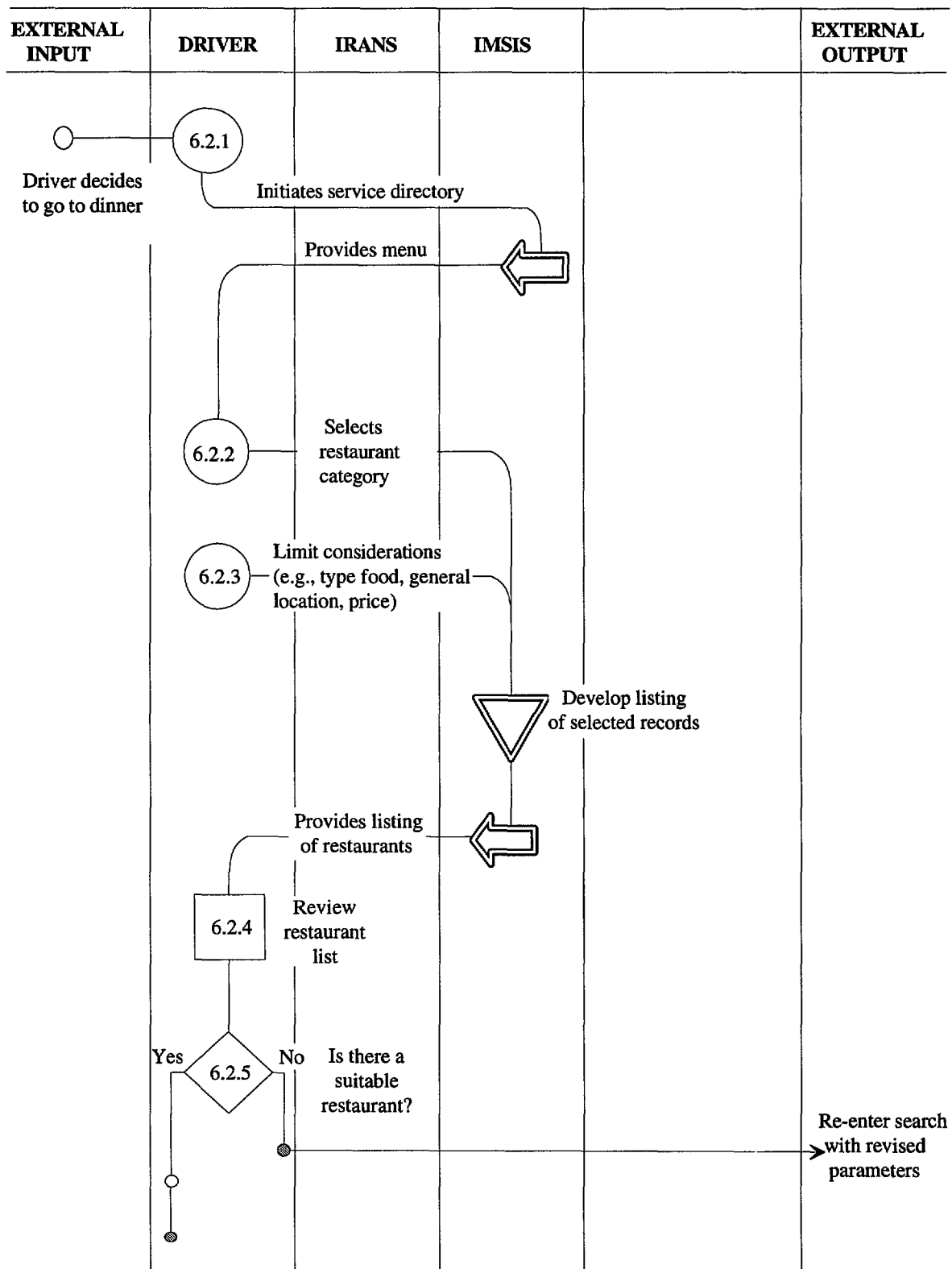


Figure 36. Operational sequence diagram for Scenario P16.

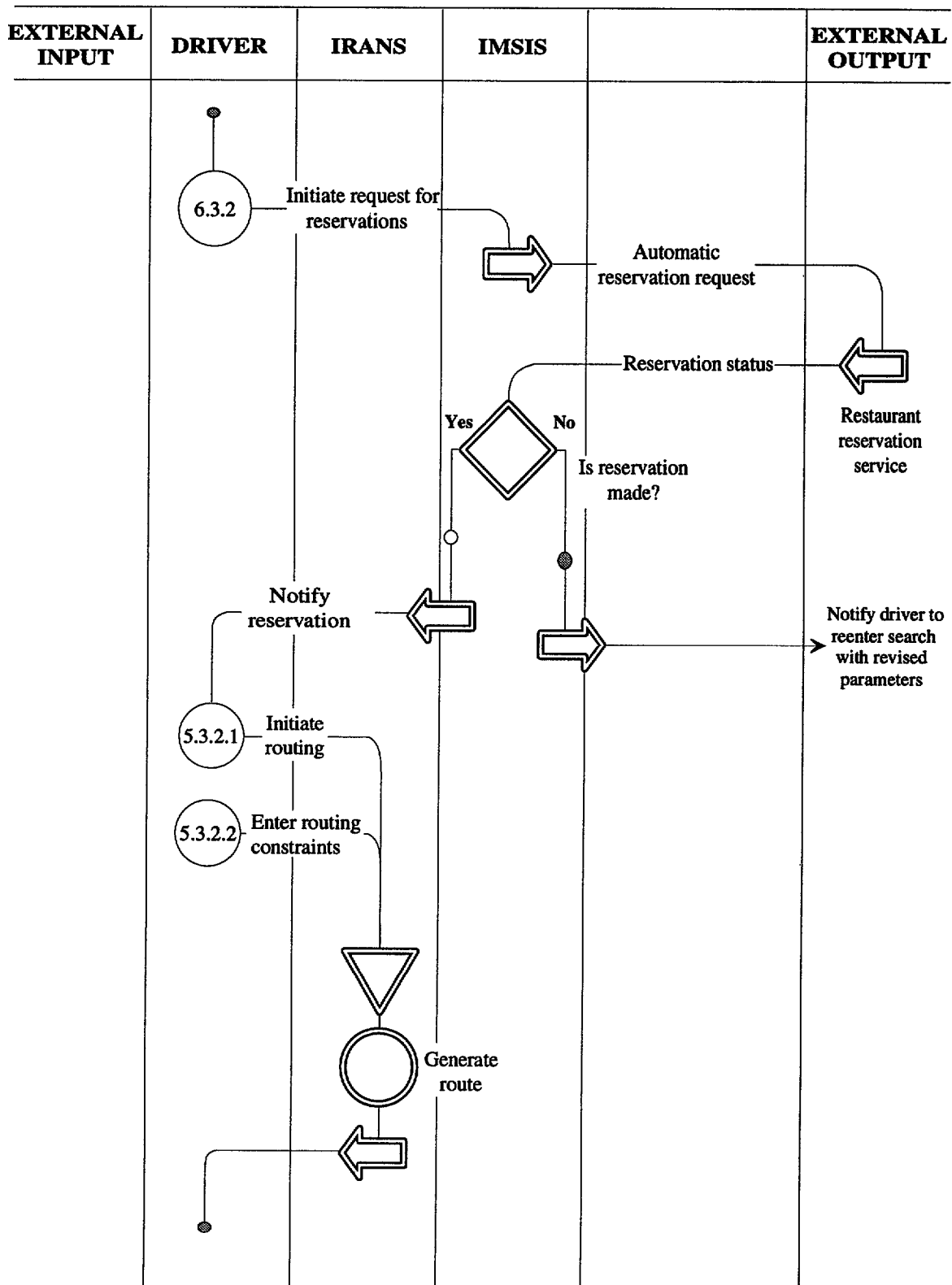


Figure 36. Operational sequence diagram for Scenario P16 (continued).

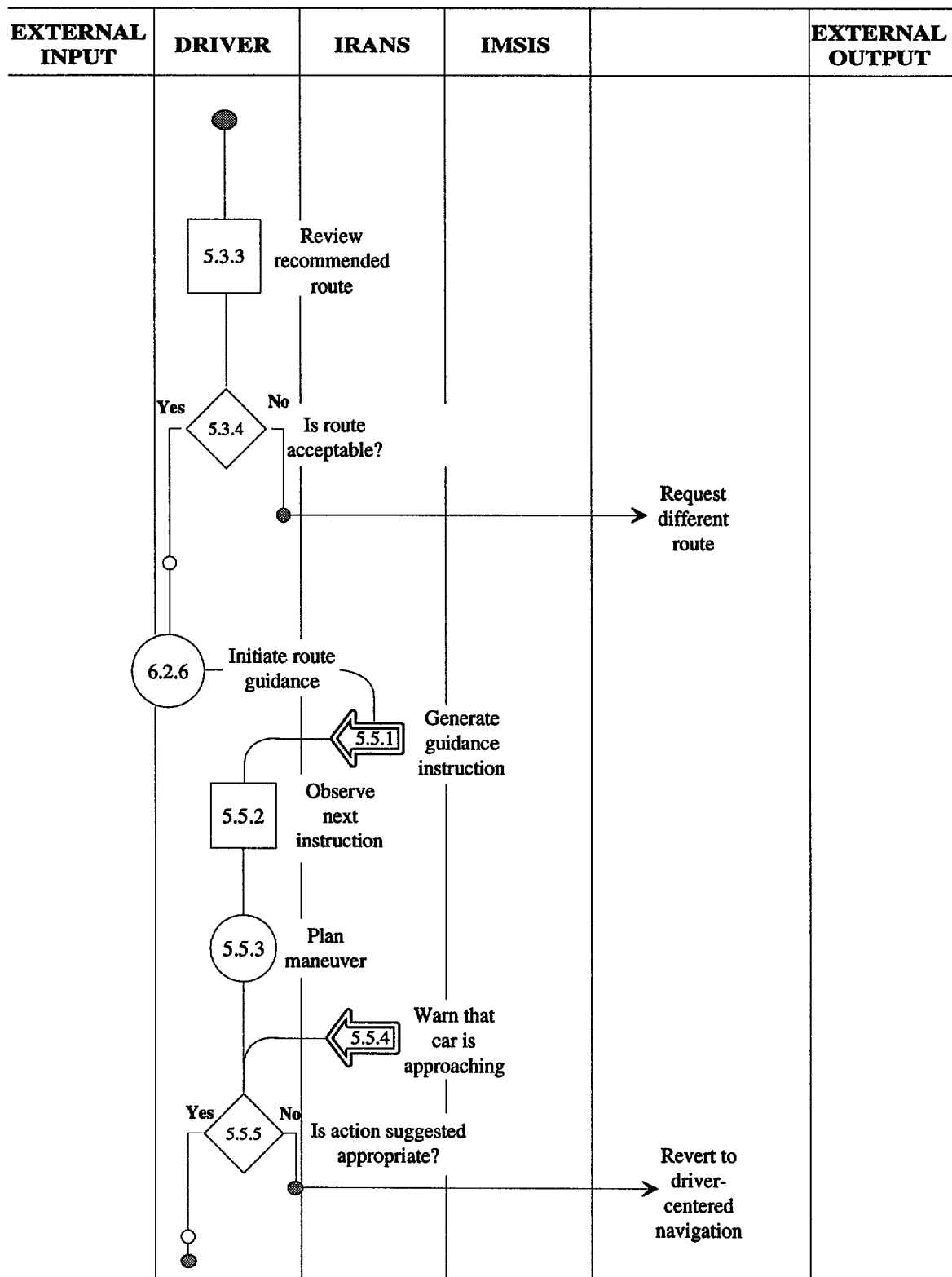


Figure 36. Operational sequence diagram for Scenario P16 (continued).

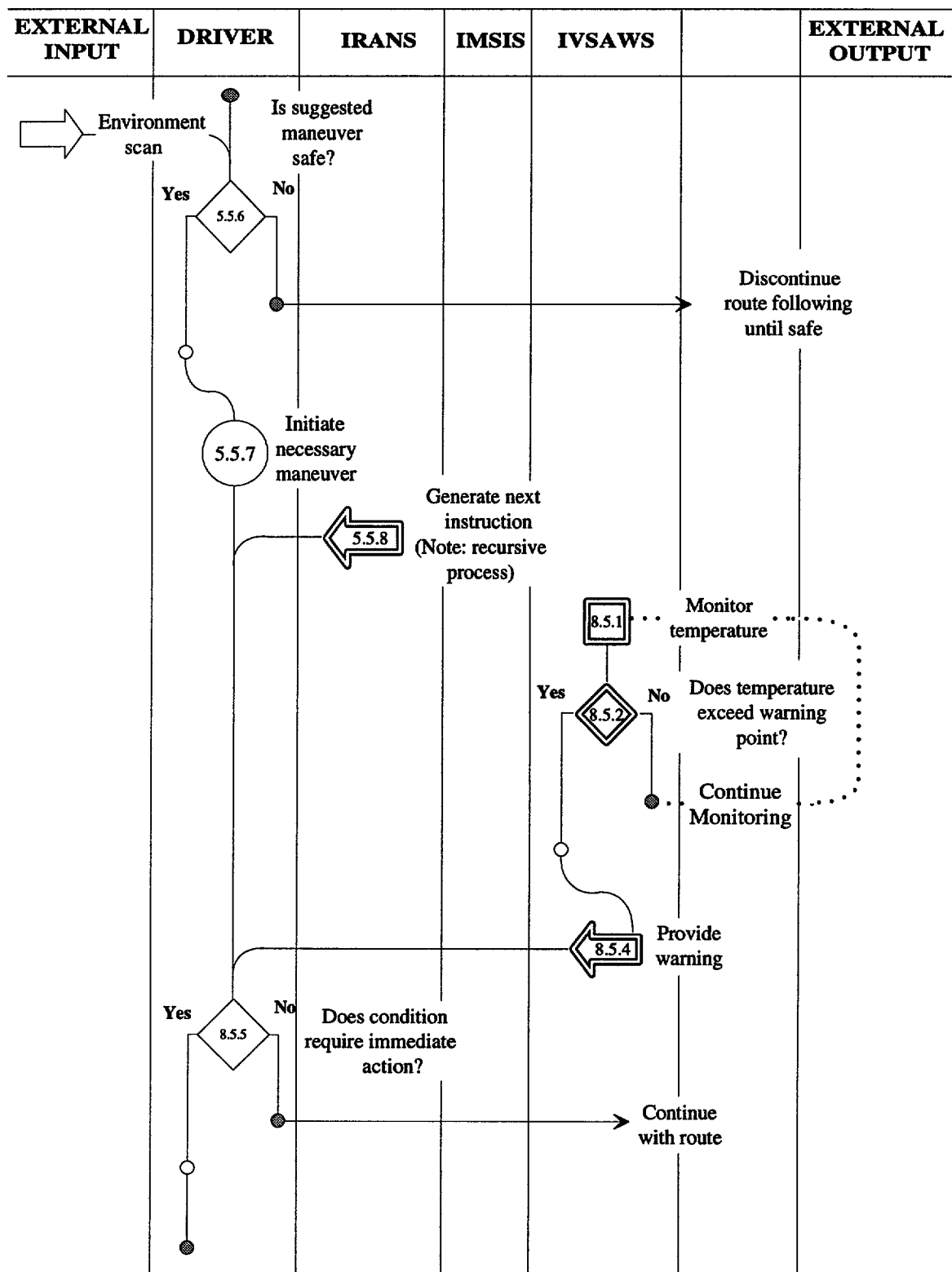


Figure 36. Operational sequence diagram for Scenario P16 (continued).

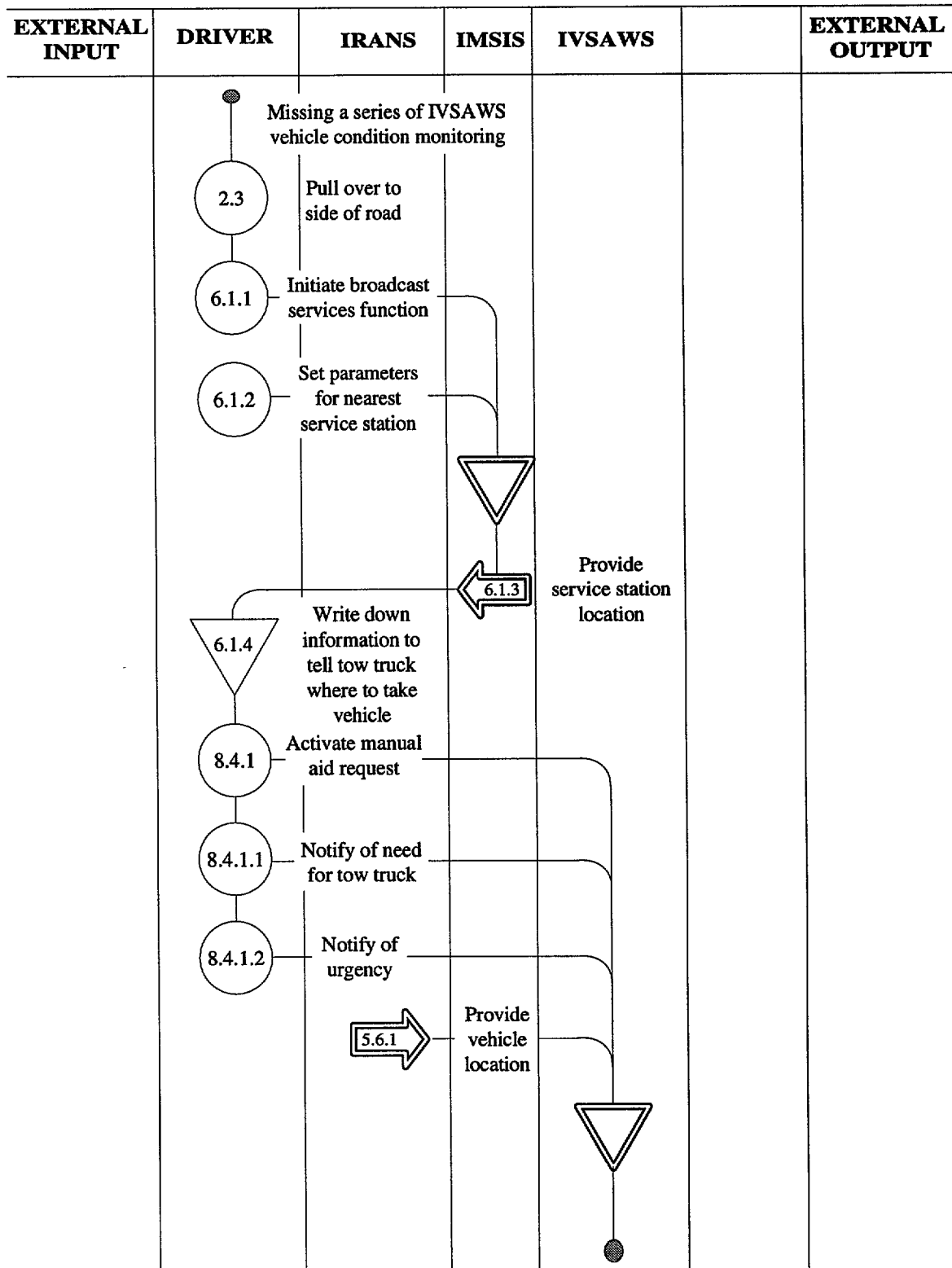


Figure 36. Operational sequence diagram for Scenario P16 (continued).

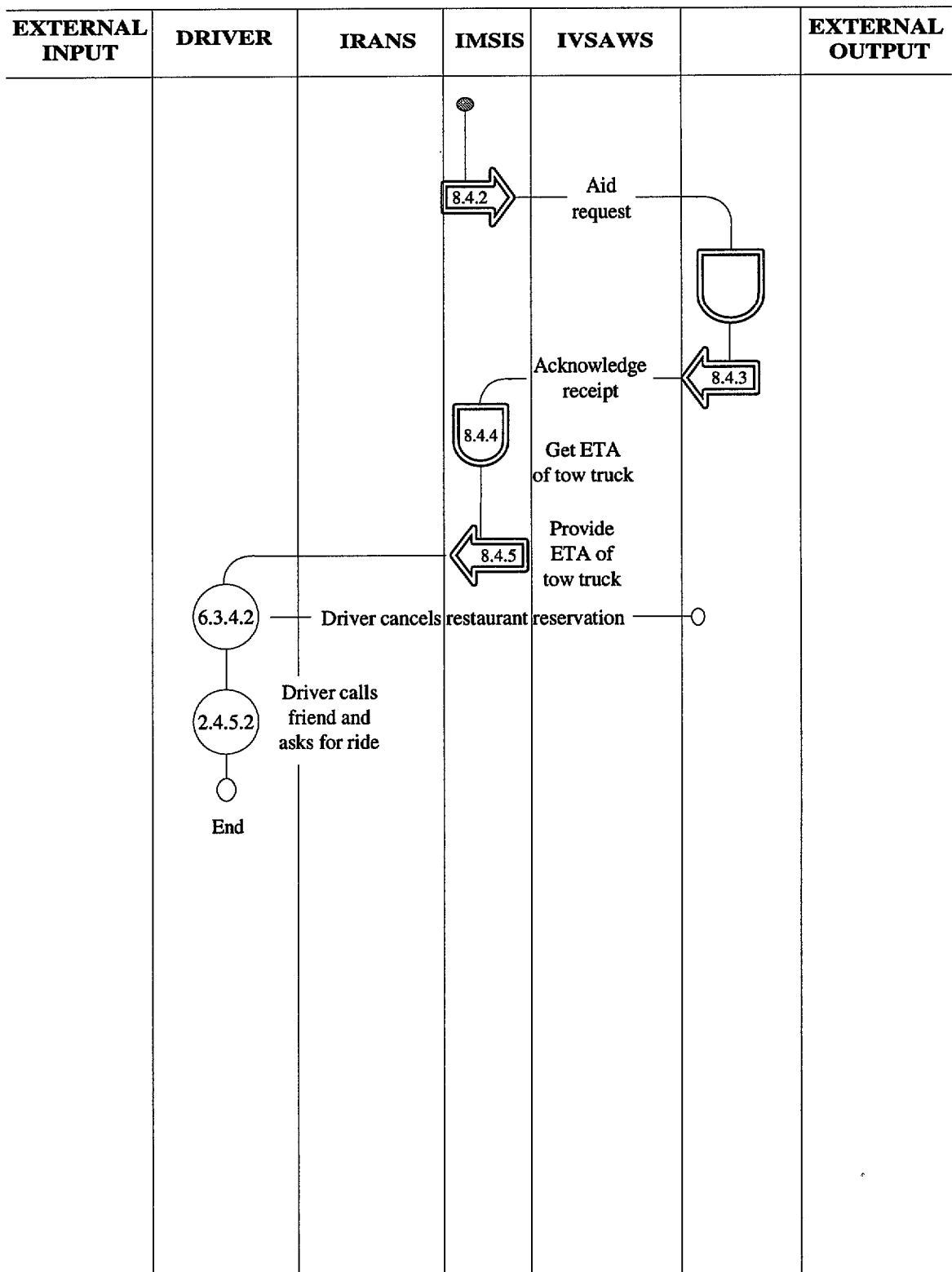


Figure 36. Operational sequence diagram for Scenario P16 (continued).

Table 58. Task characterization of Scenario P16.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
5.2.1	DRIVER INITIATES SERVICES/ ATTRACTIONS DIRECTORY	Make a system ready to use	Goal initiation	CONTROL	Requirements don't exceed driver's response capabilities.	
UNCODED SYSTEM ACTIONS						
i.2.2	SELECT CLASS OF SERVICES DESIRED	Limit system considerations	System demand	DECIDE/SELECT	Adequate information for user to predict outcome.	
.2.3	SELECT PARAMETERS FOR CLASS OF SERVICES	Limit system considerations	System demand	CODE	Motor actions within human capabilities.	
UNCODED SYSTEM ACTIONS						
.2.4	REVIEW LISTING	Obtain system information	Completion of previous step	SEARCH	Information presented must be consistent with user's knowledge base.	
.2.5	SELECT ITEM FROM LISTING	Approve system output and initiate next step	Completion of previous step	CONTROL	Requirements don't exceed driver's response capabilities. System provides indication that the system is responding to input.	
.3.2	INITIATE DESTINATION COORDINATION	Invoke system operation	System demand	CONTROL	System provides indication of action completion. System provides indication that the system is responding to input.	

Table 58. Task characterization of Scenario P16.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
& CODED SYSTEM ACTIONS						
1.3.2.1	DESTINATION	Provide system information	System demand	CONTROL	System provides indication that the system is responding to input.	Transfer of destination from IMSIS to IRANS route guidance.
1.3.2.2	ROUTE PARAMETERS	Limit system considerations	System demand	CODE	Input requirements compatible with knowledge.	May be automated function or limited by system design.
UNCODED SYSTEM ACTIONS						
1.3.3	REVIEW RECOMMENDED ROUTE	Environmental change	Completion of previous step	INTERPRET	Information presented must be consistent with user's knowledge base. Information presented must be consistent with user's understanding of system goals.	
1.3.4	DECIDE IF ROUTE IS ACCEPTABLE	Verify output meets expectations	Completion of previous step	DECIDE/SELECT	Adequate information for user to predict outcome. Recommendations consistent with driver's experience. Recommendations don't violate known conditions or limitations.	

Table 58. Task characterization of Scenario Pl6.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.2.6	INITIATE ROUTE GUIDANCE TO SELECTED ITEM	Invoke system operation	Change of goals	CONTROL	Requirements don't exceed driver's response capabilities. System provides indication that the system is responding to input.	
5.5.1	SYSTEM GENERATES INSTRUCTION	Invoke system operation	Completion of previous step	CODE		Automatic system action.
i.5.2	DRIVER OBSERVES INSTRUCTION FOR NEXT ACTION	Understand system/environmental information	Completion of previous step	INTERPRET	Information presented must be consistent with user's knowledge base. Information presented must be consistent with user's understanding of system goals.	
i.5.3	DRIVER PLANS FOR NEXT ROUTE ACTION	Understand system/environmental information	Completion of previous step	PLAN	System allows adequate time for execution. System provides necessary information.	
5.5.4	SYSTEM ALERTS DRIVER OF APPROACHING ACTION POINT	Invoke system operation	Completion of previous step	IDENTIFY		Automatic system action.

Table 58. Task characterization of Scenario P16.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.5.5	DRIVER CONFIRMS ACTION IS APPROPRIATE	Evaluate system recommendation	Completion of previous step	TEST	Recommendations in appropriate detail to identify compatibility with constraints.	
5.5.6	DRIVER CONFIRMS THAT ACTION IS SAFE	Obtain environment information	Completion of previous step	TEST	Recommendations in appropriate detail to identify compatibility with constraints.	Driver is checking to make sure that ATIS directions are not in conflict with the primary task of driving,
5.5.7	DRIVER INITIATES NECESSARY ACTION	Execute system recommendation	Completion of previous step	CONTROL	Requirements don't exceed driver's response capabilities.	Maneuvers the vehicle to the necessary point.
5.5.8	DRIVER COMPLETES NECESSARY ACTION	Make a system ready to use	Completion of previous step	CONTROL	System provides indication of action completion.	
5.5.1	SYSTEM MONITORS VEHICLE PARAMETERS	Maintain safe conditions (general)	System demand	MONITOR		Automatic system action.
3.5.2	SYSTEM DETECTS ABNORMAL CONDITION	Obtain system information	Environmental change	TEST		Automatic system action comparing measured conditon against trip point.

Table 58. Task characterization of Scenario P16.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
8.5.4	SYSTEM PROVIDES DESCRIPTION OF PROBLEM	Obtain system information	Completion of previous step	CODE		Automatic system action.
8.5.5	DRIVER TAKES APPROPRIATE ACTION	Understand system/ environmental information	Change of goals	DECIDE	Adequate information for user to predict outcome.	
2	CONTROL	Invoke system operation	Goal initiation	CONTROL	Requirements don't exceed driver's response capability.	
6.1.1	DRIVER INITIATES BROADCAST SERVICES RECEIVING EQUIPMENT	Make a system ready to use	Goal initiation	CONTROL	Requirements don't exceed driver's response capabilities. System provides indication that the system is responding to input.	
6.1.2	DRIVER ENTERS SCREENING PARAMETERS	Limit system considerations	System demand	CODE	Input requirements directly.	(E.g., services of interest and proximity to route.)
UNCODED SYSTEM ACTIONS						
6.1.3	SYSTEM PROVIDES ANNOUNCEMENT OF SERVICES AS APPROACHED	Invoke system operation	Environmental change	CODE		Automatic system action.

Table 58. Task characterization of Scenario P16.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
6.1.4	DRIVER TAKES DESIRED ACTION REGARDING SERVICES	Execute system recommendation	Change of goals	DECIDE/SELECT	Adequate information for user to predict outcome.	
8.4.1	DRIVER ACTIVATES MANUAL AID REQUEST	Invoke system operation	Goal initiation	CODE	Motor actions within human capabilities. Input requirements compatible with knowledge.	(E.g., aid required, urgency.)
8.4.1.1	AID REQUIRED	Provide system information	System requirements	CODE	Motor actions within human capabilities. Input requirements compatible with knowledge.	
8.4.1.2	URGENCY	Provide system information	System requirements	CODE	Motor actions within human capabilities. Input requirements compatible with knowledge.	
5.6.1	SYSTEM PROVIDES NAVIGATION INFORMATION	Obtain system information	Completion of previous step	CODE		Automatic system action transfer from IRANS to IVSAWS.
UNCODED SYSTEM ACTIONS						
8.4.2	SYSTEM SENDS REQUEST AS WELL AS VEHICLE LOCATION	Automatic system operation	Completion of previous step	CONTROL		Automatic system function.

Table 58. Task characterization of Scenario P16.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
UNCODED SYSTEM ACTIONS						
.4.3	SYSTEM ACKNOWLEDGES REQUEST RECEIVED	Automatic system operation	Completion of previous step	CODE		External system action to provide feedback to driver that request has been received. May be automatic.
.4.4	SYSTEM GETS UPDATE OF ARRIVAL TIME FOR AID	Obtain system information	Environmental Change	INTERPRET		Automatic system action in this scenario.
.4.5	NOTIFIES DRIVER OF ARRIVAL TIME FOR All	Obtain system information	Environmental Change	CODE		To provide feedback to driver as to when aid will arrive. Automatic system action.
.3.4.2	DRIVER UPDATES CHANGES IN SERVICE REQUIRED	Invoke system operation	Change in goals	CONTROL	System provides indications of action completion.	
.4.5.2	OPERATE TWO-WAY COMMUNICATIONS (AUDIO)	Invoke system operation	Goal initiation	CODE	Input requirement directly.	
END OF SCENARIO						

Scenario P1

Purpose

To illustrate the sequencing type of interactions among various functional characteristics.

Summary

A driver vacationing with his family in an urban setting arrives at the airport in mid-afternoon and rents a car with an IRANS device installed. The family's plan is to go directly to their hotel located in the city 10 mi (16.1 km) from the airport. The weather is good, but there is a substantial level of congestion on the major highways between the airport and the hotel due to normal commuting traffic. After receiving a brief orientation on using IRANS at the rental office, the driver identifies his destination on the IRANS and requests the fastest route. The IRANS recommends a route that the driver accepts and he begins his trip to the hotel.

Function Interaction Diagram

See figure 37.

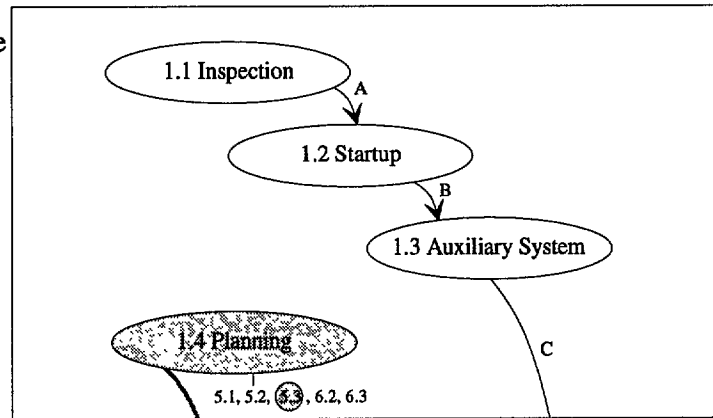
Operational Sequence Diagram

See figure 38.

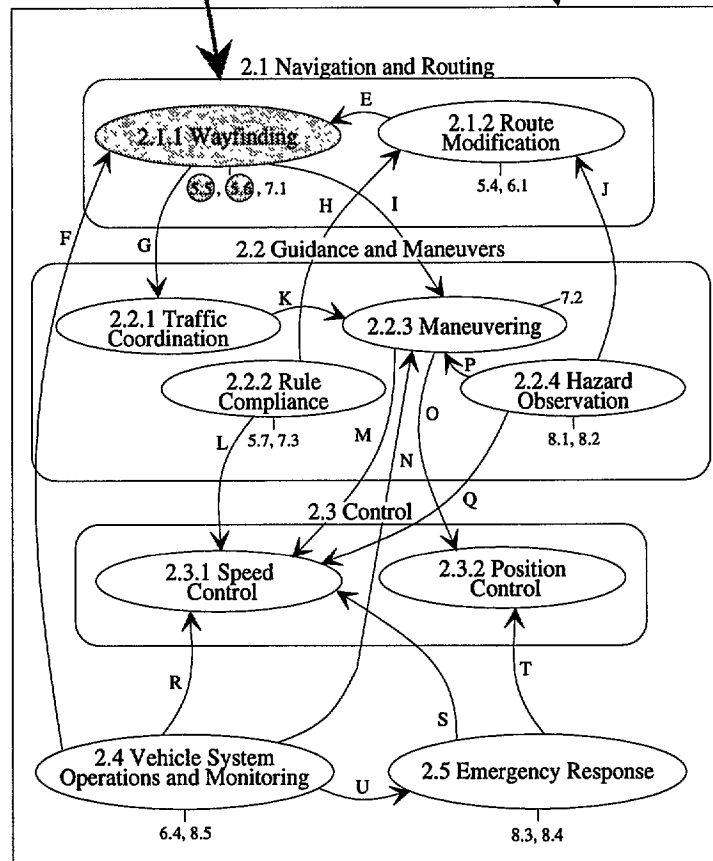
Task Characterization

See table 59.

1. Pre-Drive



2. Drive



A Vehicle safety verified	I Maneuver required	O Requires change in lane position
B Vehicle initiated	J Potential hazards identified in upcoming roadway	P Hazard identified
C Auxiliary systems initiated	K Identification of safe path through traffic	Q Immediate hazard identified
D Destination and route selected	L Deviation from regulations	R Vehicle failure
E Route change identified	M Requires speed increase/decrease	S Conditions requiring immediate response
F Vehicle service required	N Failure requires change in speed/position	T Conditions requiring immediate response
G Maneuver required		U Minimize injury/damage
H Regulatory limits on roadway		

Figure 37. Function interaction diagram for Scenario P1.

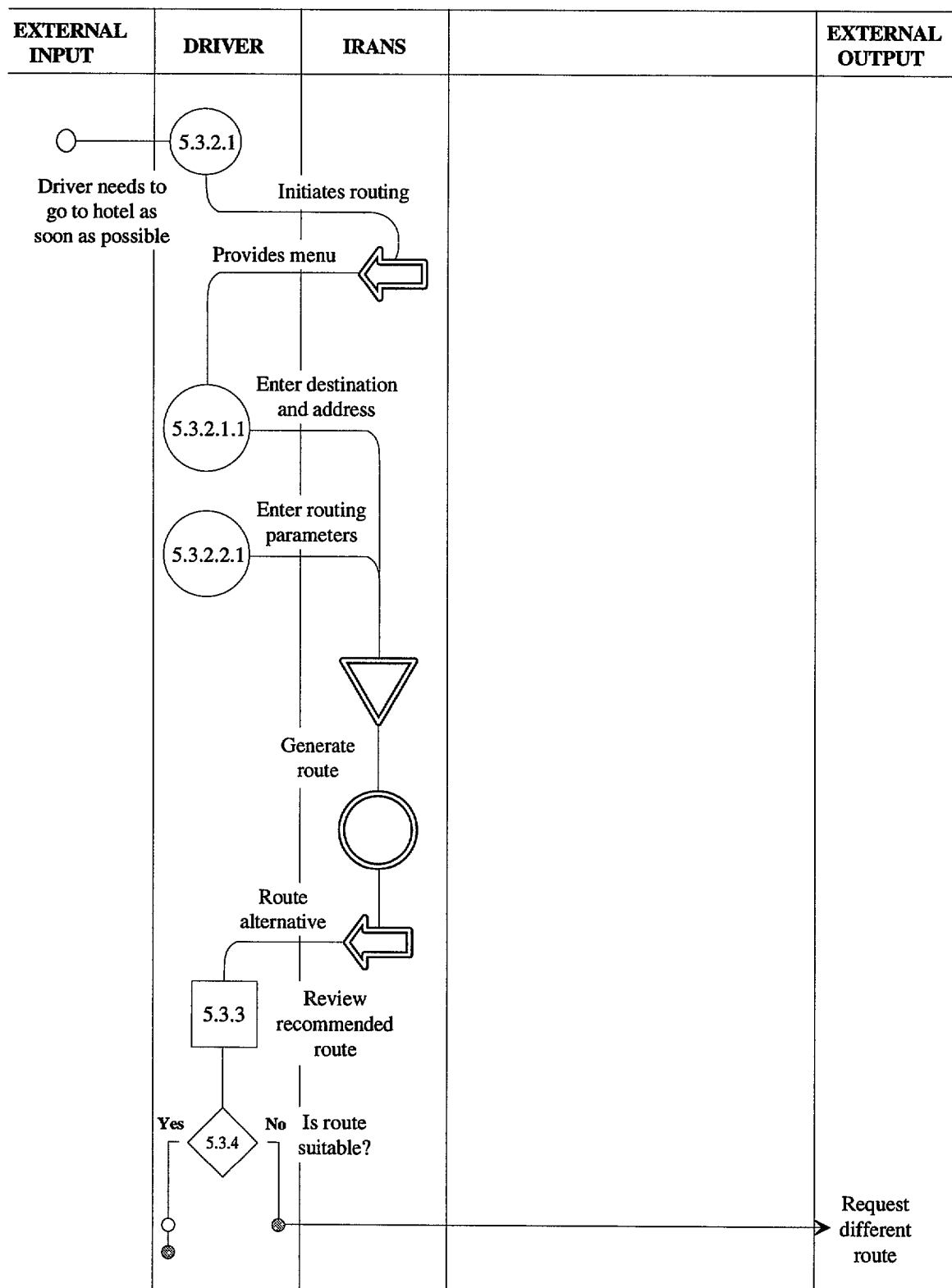


Figure 38. Operational sequence diagram for Scenario P1.

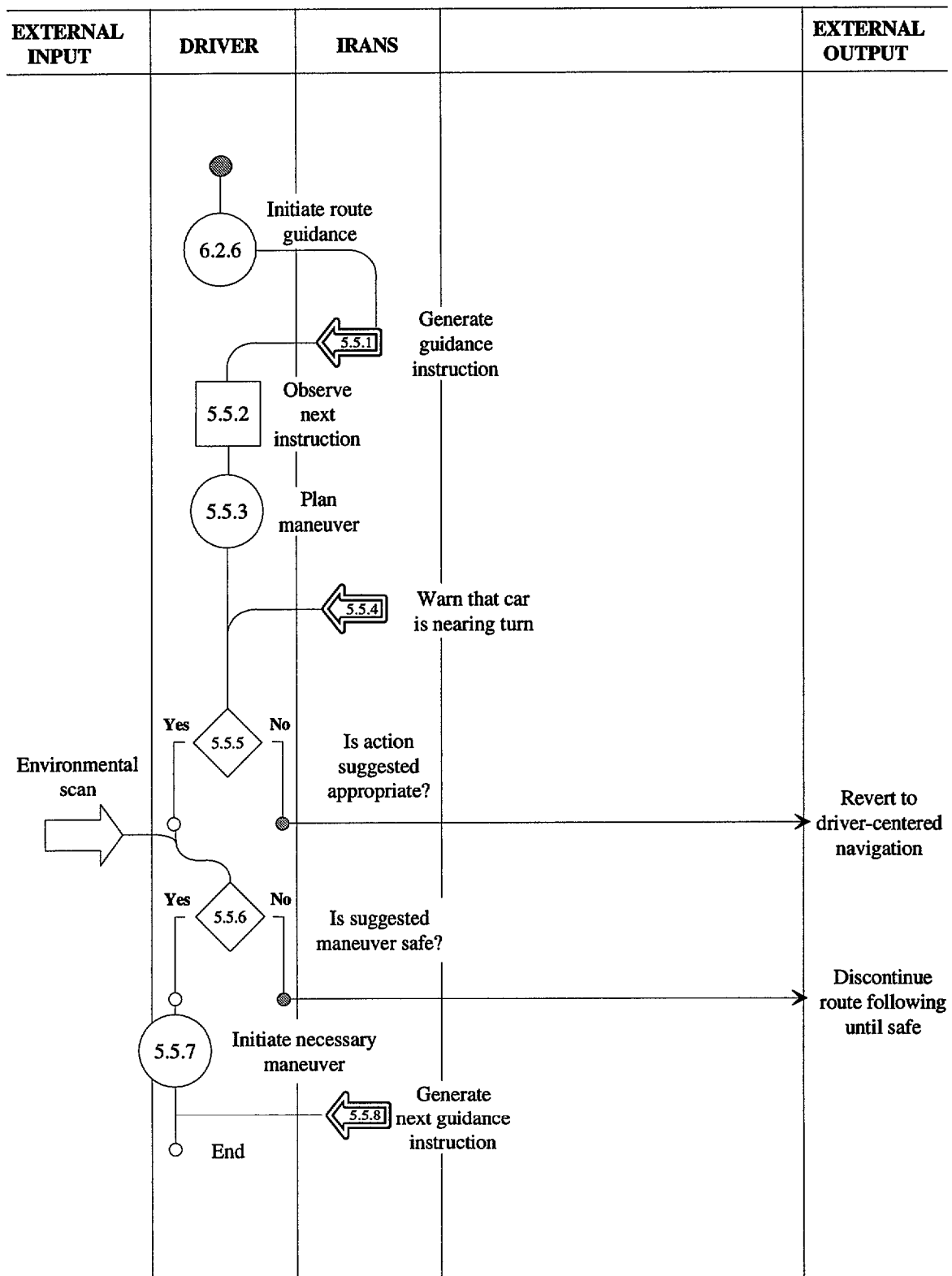


Figure 38. Operational sequence diagram for Scenario P1 (continued).

Table 59. Task characterization of Scenario Pl.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
.3.2.1	DESTINATION	Provide system information	System demand	CONTROL	Requirements don't exceed driver's response capabilities.	
UNCODED SYSTEM ACTIONS						
5.3.2.1.1	ENTER DESTINATION	Provide system information	System demand	CODE	Motor actions within human capabilities. Input requirements direct.	
5.3.2.2.1	ENTER ROUTING PARAMETERS	Provide system information	System demand	CODE	Input requirements compatible with knowledge.	
UNCODED SYSTEM ACTIONS						
5.3.3	REVIEW RECOMMENDED ROUTE	Environmental change	Completion of previous step	INTERPRET	Information presented must be consistent with user's knowledge base. Information presented must be consistent with user's understanding of system goals.	

Table 59. Task characterization of Scenario Pl.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.3.4	DECIDE IF ROUTE IS ACCEPTABLE	Verify output meets expectations	Completion of previous step	DECIDE/SELECT	Adequate information for user to predict outcome. Recommendations consistent with driver's experience. Recommendations don't violate known conditions or limitations.	
5.2.6	INITIATE ROUTE GUIDANCE TO SELECTED ITEM	Invoke system operation	Change of goals	CONTROL	Requirements don't exceed driver's response capabilities. System provides indication that the system is responding to input.	Transfer of information from IMSIS to IRANS may be automatic.
5.5.1	SYSTEM GENERATES INSTRUCTION	Invoke system operation	Completion of previous step	CODE		Automatic system action.
5.5.2	DRIVER OBSERVES INSTRUCTION FOR NEXT ACTION	Understand system/ environmental information	Completion of previous step	INTERPRET	Information presented must be consistent with user's knowledge base. Information presented must be consistent with user's understanding of system goals.	

Table 59. Task characterization of Scenario P1.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.5.3	DRIVER PLANS FOR NEXT ROUTE ACTION	Understand system/environmental information	Completion of previous step	PLAN	System allows adequate time for execution. System provides necessary information.	
5.5.4	SYSTEM ALERTS DRIVER OF APPROACHING ACTION POINT	Invoke system operation	Completion of previous step	IDENTIFY		Automatic system action.
5.5.5	DRIVER CONFIRMS ACTION IS APPROPRIATE	Evaluate system recommendation	Completion of previous step	TEST	Recommendations in appropriate detail to identify compatibility with constraints. Level of detail does not increase workload.	
5.5.6	DRIVER CONFIRMS THAT ACTION IS SAFE	Obtain environment information	Completion of previous step	TEST	Recommendations in appropriate detail to identify compatibility with constraints. Recommendations compatible with short-term memory. Level of detail does not increase workload.	Driver is checking to ensure directions do not conflict with the primary driving task.
5.5.7	DRIVER INITIATES NECESSARY ACTION	Execute system recommendation	Completion of previous step	CONTROL	Requirements don't exceed driver's response capabilities.	Maneuvers vehicle to the necessary point.

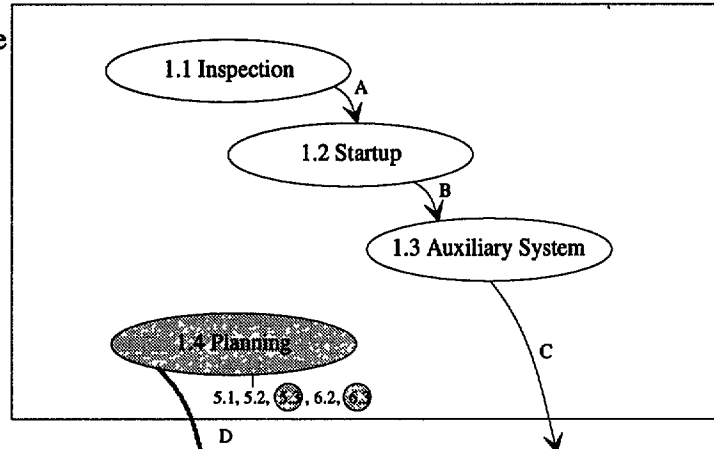
Table 59. Task characterization of Scenario Pl.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.5.8	DRIVER COMPLETES NECESSARY ACTION	Make system ready to use	Completion of previous step	CONTROL		Automatic system action.
END OF SCENARIO						

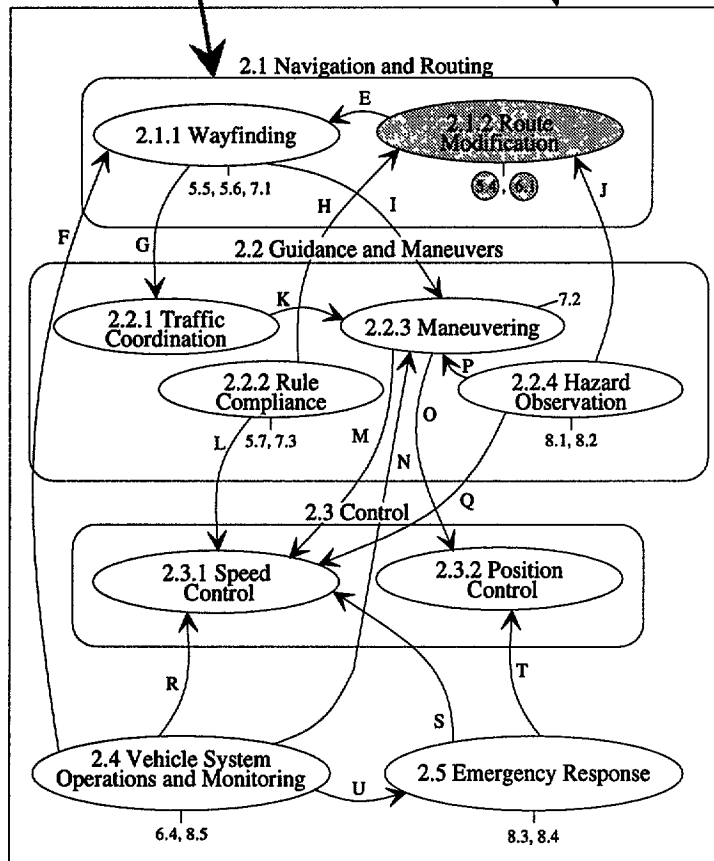
Scenario P20

<u>Purpose</u>	To illustrate the branching type of interactions among various functional characteristics.
<u>Summary</u>	It is Friday afternoon and a driver is following the IRANS guidance in traveling back to her hotel from an appointment with a client. As she drives, she receives the broadcast signal of a nearby winery. She debates between continuing to her hotel or visiting the winery. She uses the ATIS to verify if the winery is open and makes a reservation for the next guided tour. Moments later, she requests a dynamic route change to proceed toward the winery.
<u>Function Interaction Diagram</u>	See figure 39.
<u>Operational Sequence Diagram</u>	See figure 40.
<u>Task Characterization</u>	See table 60.

1. Pre-Drive



2. Drive



A Vehicle safety verified	I Maneuver required	O Requires change in lane position
B Vehicle initiated	J Potential hazards identified in upcoming roadway	P Hazard identified
C Auxiliary systems initiated	K Identification of safe path through traffic	Q Immediate hazard identified
D Destination and route selected	L Deviation from regulations	R Vehicle failure
E Route change identified	M Requires speed increase/decrease	S Conditions requiring immediate response
F Vehicle service required	N Failure requires change in speed/position	T Conditions requiring immediate response
G Maneuver required		U Minimize injury/damage
H Regulatory limits on roadway		

Figure 39. Function interaction diagram for Scenario P20.

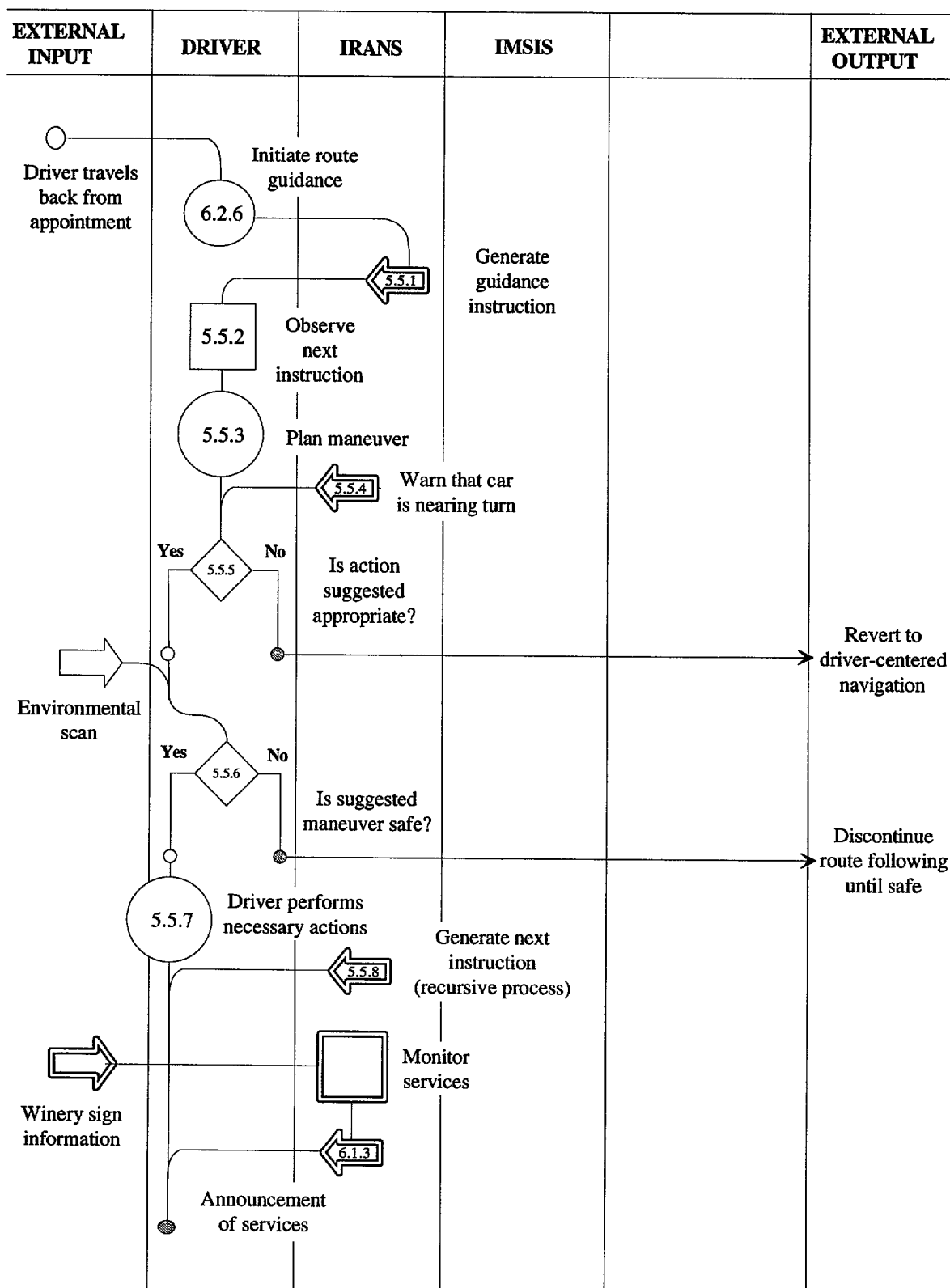


Figure 40. Operational sequence diagram for Scenario P20.

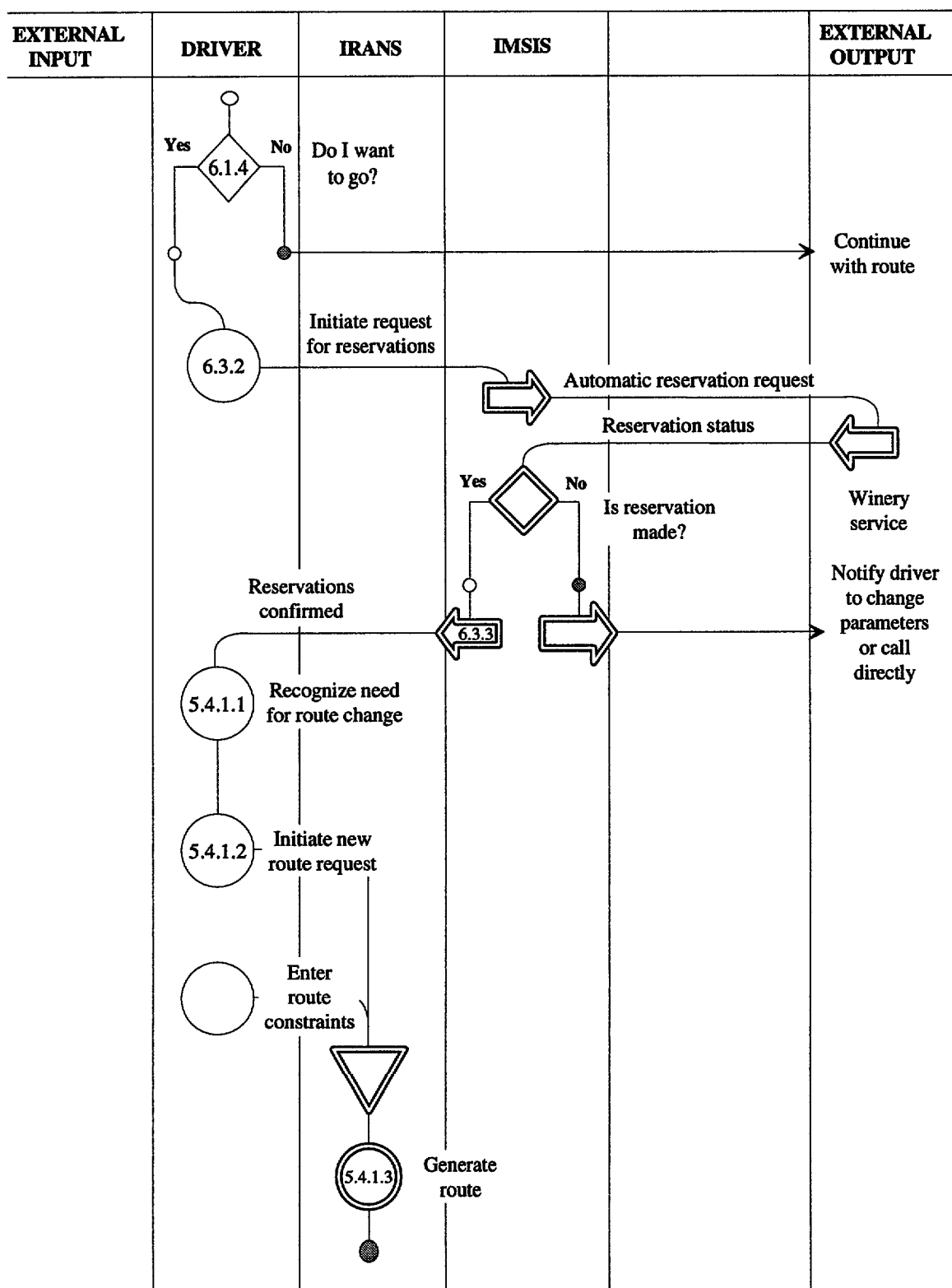


Figure 40. Operational sequence diagram for Scenario P20 (continued).

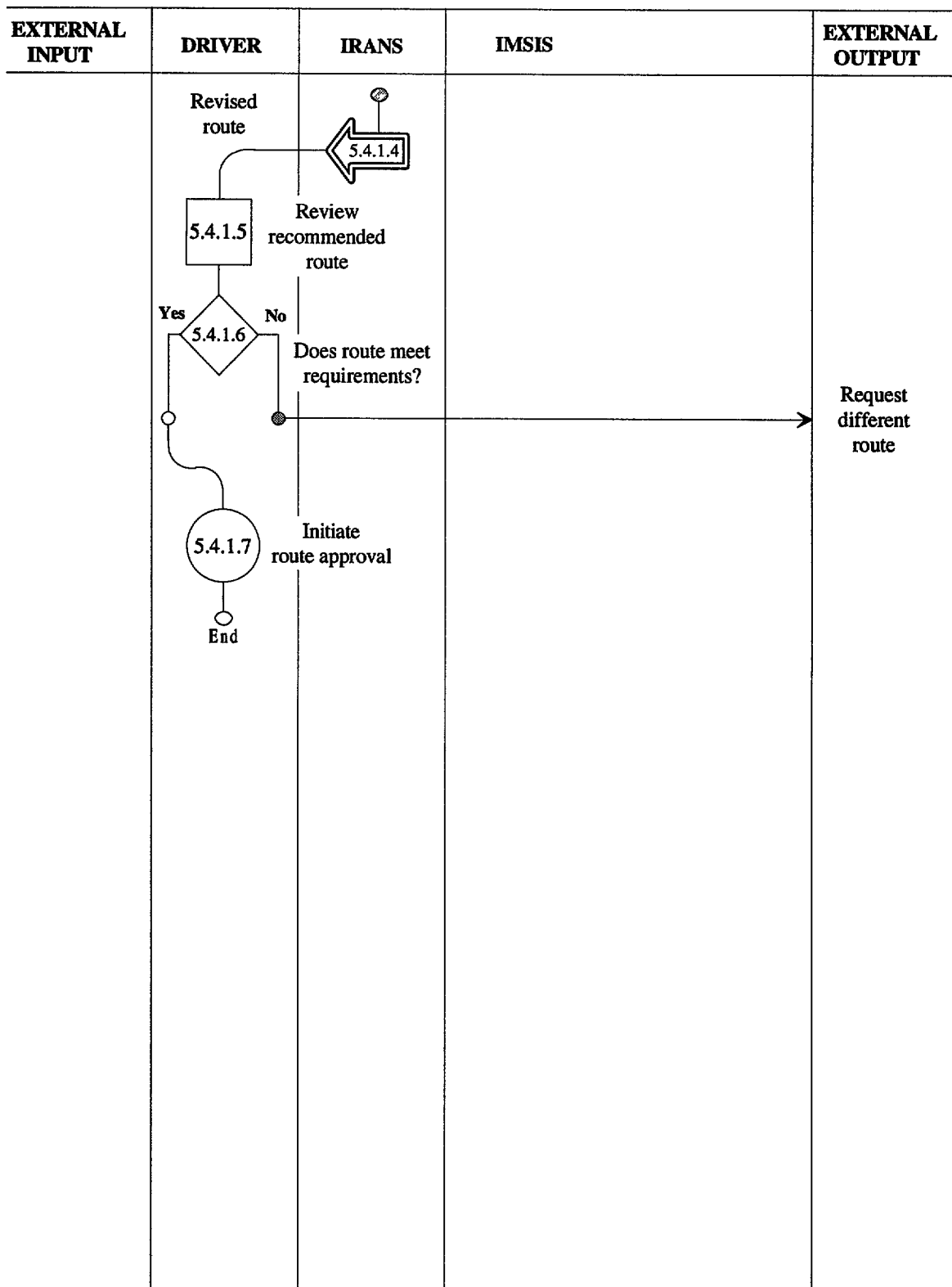


Figure 40. Operational sequence diagram for Scenario P20 (continued).

Table 60. Task characterization of Scenario P20.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
2.6	INITIATE ROUTE GUIDANCE TO SELECTED ITEM	Invoke system operation	Change of goals	CONTROL	System provides indication that the system is responding to input.	
5.1	SYSTEM GENERATES INSTRUCTION	Invoke system operation	Completion of previous step	CODE		Automatic system action.
,5.2	DRIVER OBSERVES INSTRUCTION FOR NEXT ACTION	Understand system/ environmental information	Completion of previous step	INTERPRET	Information presented must be consistent with user's knowledge base. Information presented must be consistent with user's understanding of system goals.	
,5.3	DRIVER PLANS FOR NEXT ROUTE ACTION	Understand system/ environmental information	Completion of previous step	PLAN	System allows adequate time for execution. System provides necessary information.	
.5.4	SYSTEM ALERTS DRIVER OF APPROACHING ACTION POINT	Invoke system operation	Completion of previous step	IDENTIFY		Automatic system action.

Table 60. Task characterization of Scenario P20.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.5.5	DRIVER CONFIRMS ACTION IS APPROPRIATE	Evaluate system recommendation	Completion of previous step	DECIDE/SELECT	System must provide adequate information for user to predict outcome of each option presented.	
5.6	DRIVER CONFIRMS THAT ACTION IS SAFE	Obtain environment information	Completion of previous step	DECIDE/SELECT	System must provide adequate information for user to predict outcome.	Task is linked to primary driving task.
5.7	DRIVER INITIATES NECESSARY ACTION	Execute system recommendation	Completion of previous step	CONTROL	Requirements don't exceed driver's response capabilities.	
5.8	DRIVER COMPLETES NECESSARY ACTION	Make system ready to use	Completion of previous step	CODE		Automatic system action.
UNCODED SYSTEM ACTIONS						
1.3	SYSTEM PROVIDES ANNOUNCEMENT OF SERVICES AS APPROACHED	Invoke system operation	Environmental change	CODE		Automatic system action.

Table 60. Task characterization of Scenario P20.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.1.4	DRIVER TAKES DESIRED ACTION REGARDING SERVICES	Execute system recommendation	Change of goals	DECIDE/SELECT	System must provide adequate information to predict outcome.	
5.3.2	INITIATE DESTINATION COORDINATION	Invoke system operation	System demand	CONTROL	System provides indication that the system is responding to input.	
UNCODED SYSTEM ACTIONS						
6.3.3	OBTAIN VERIFICATION OF COORDINATION	Verify output meets expectations	Completion of previous step	TEST		Automatic system action.
5.4.1.1	DRIVER RECOGNIZES NEED FOR REVISED ROUTE	Modify system operation	Change of goals	INTERPRET	Information presented must be consistent with user's knowledge base. Information presented must be consistent with user's understanding of system goals.	

Table 60. Task characterization of Scenario P20.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.4.1.2	INITIATE NEW ROUTE REQUEST OF IRANS	Provide system information	Completion of previous step	CONTROL	Requirements don't exceed driver's response capabilities. System provides indication that the system is responding to input.	
UNCODED DRIVER ACTIONS						
4.1.3	SYSTEM COMPUTES NEW ROUTE	Invoke system operation	Completion of previous step	COMPUTE		Automatic system action.
4.1.4	SYSTEM PRESENTS REVISED ROUTE	Obtain system information	Completion of previous step	CODE		Automatic system action.
4.1.5	DRIVER REVIEWS RECOMMENDED ROUTE	Evaluate system recommendation	Completion of previous step	TEST	Recommendations in appropriate detail to identify compatibility with constraints. Recommendations compatible with short-term memory. Level of detail does not increase workload.	

Table 60. Task characterization of Scenario P20.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.4.1.6	DECIDES IF RECOMMENDED ROUTE IS SATISFACTORY	Verify output meets expectations	Completion of previous step	DECIDE/SELECT	Adequate information for user to predict outcome. Recommendations consistent with driver's experience. Recommendations don't violate known conditions or limitations.	
5.4.1.7	INITIATE ROUTE APPROVAL	Approve system output and initiate next step	Completion of previous step	CONTROL	System provides indication that the system is responding to input.	
END OF SCENARIO						

Scenario P2

Purpose

To illustrate the interactions among various functional characteristics.

Summary

A real estate salesperson is meeting a couple at their residence. She plans on showing them several houses in a suburban area of a major city. She has selected houses in several different neighborhoods spaced around one side of the city. The neighborhoods can be reached by either highways or arterials. It is evening, there is a heavy rain, and there is an accident on one of the highways that could be taken. Two neighborhoods that would be reasonable starting points for the evening's viewing are approximately equidistant from the clients' current residence. The salesperson would like to go to the neighborhood that can be most easily reached first. Prior to picking up her clients, she enters the addresses of all of the houses in the IRANS. During the drive to her clients' house, she monitors the traffic congestion in the planned area of travel. When she arrives at the clients' residence, she requests a comparison of travel times and selects the route that is predicted to take the least time. She then reviews current traffic congestion. Finally, she picks up her clients and drives them to the first house.

Function Interaction Diagram

See figure 41.

Operational Sequence Diagram

See figure 42.

Task Characterization

See table 61.

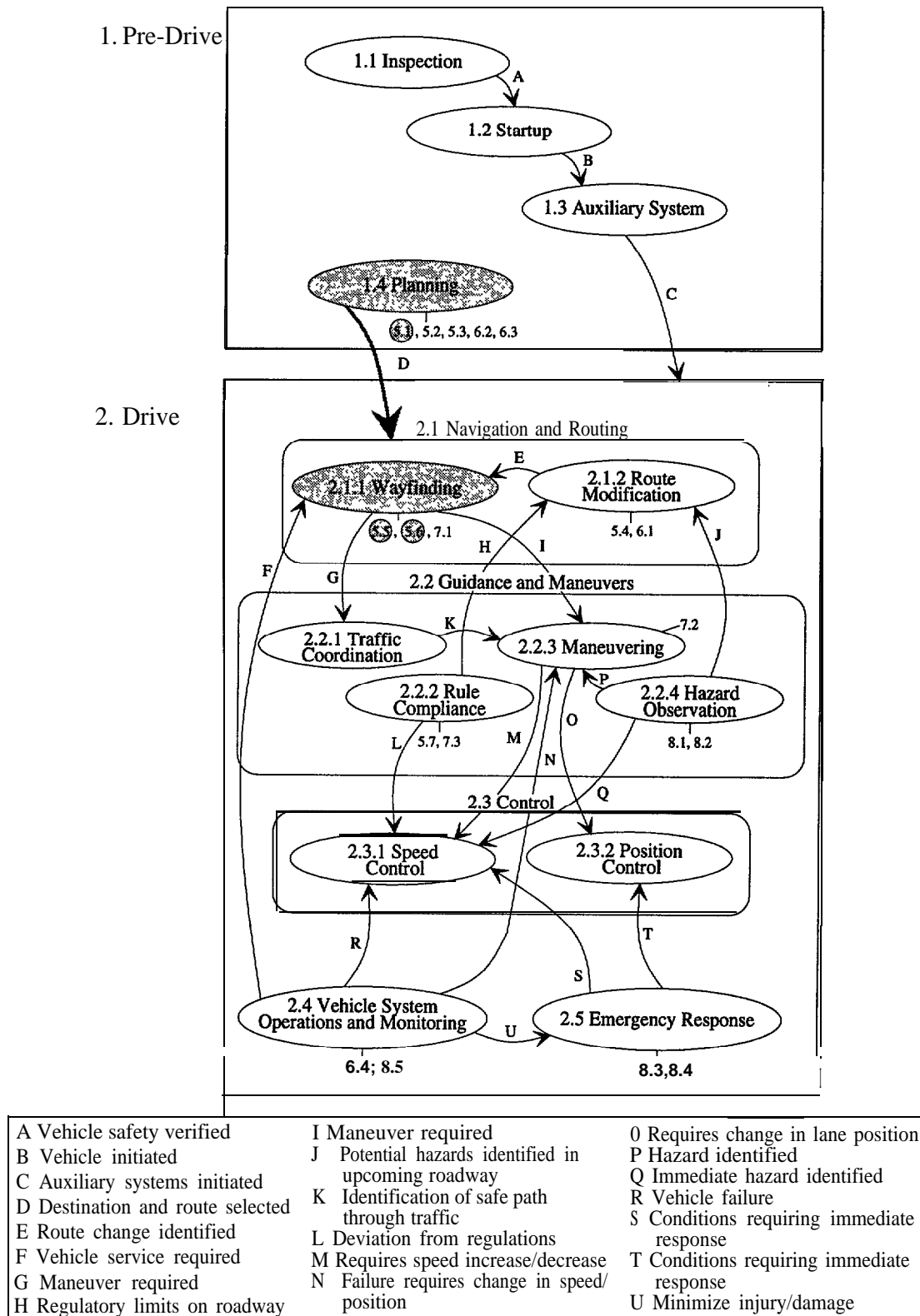


Figure 41. Function interaction diagram for Scenario P2.

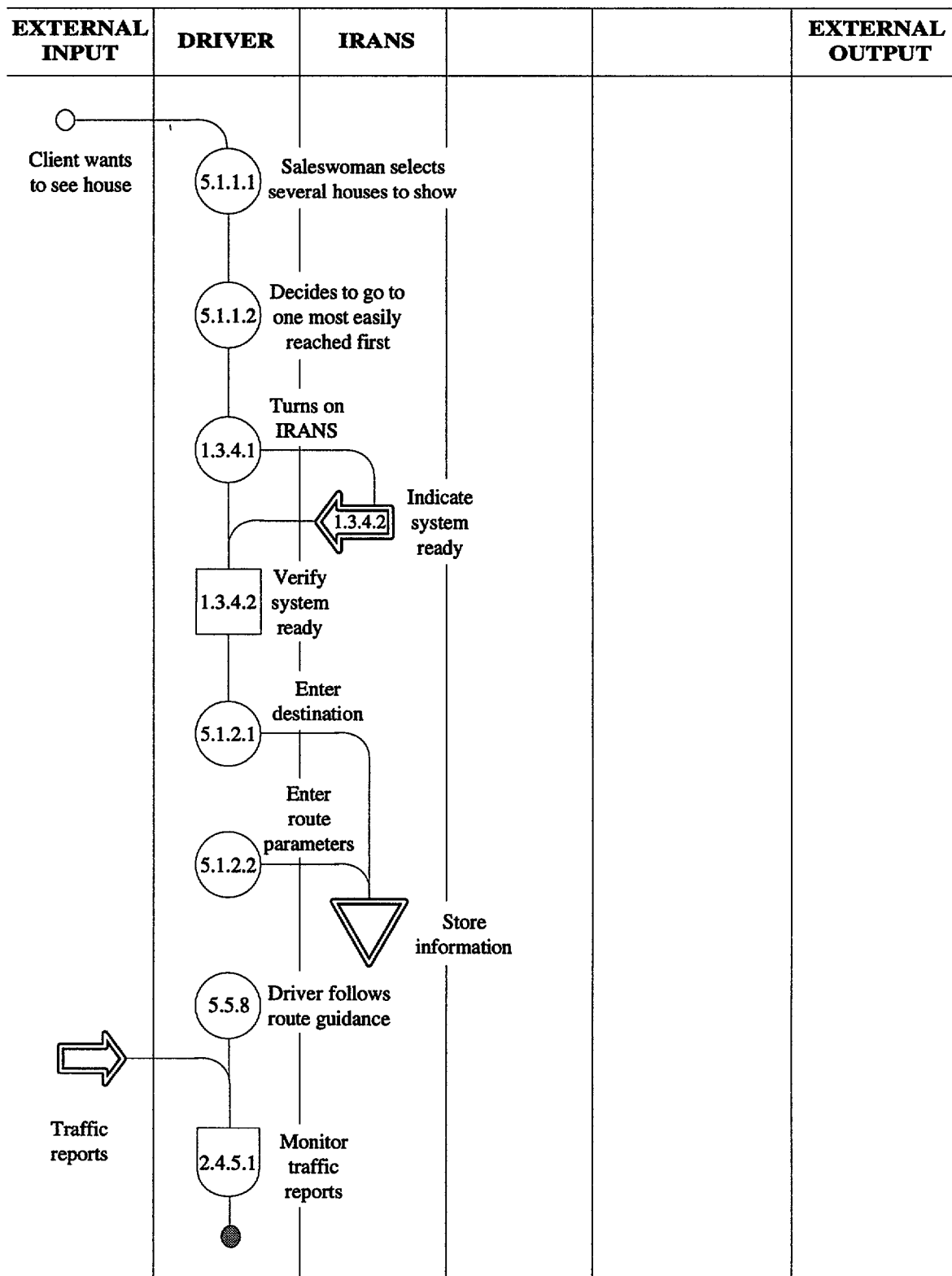


Figure 42. Operational sequence diagram for Scenario P2.

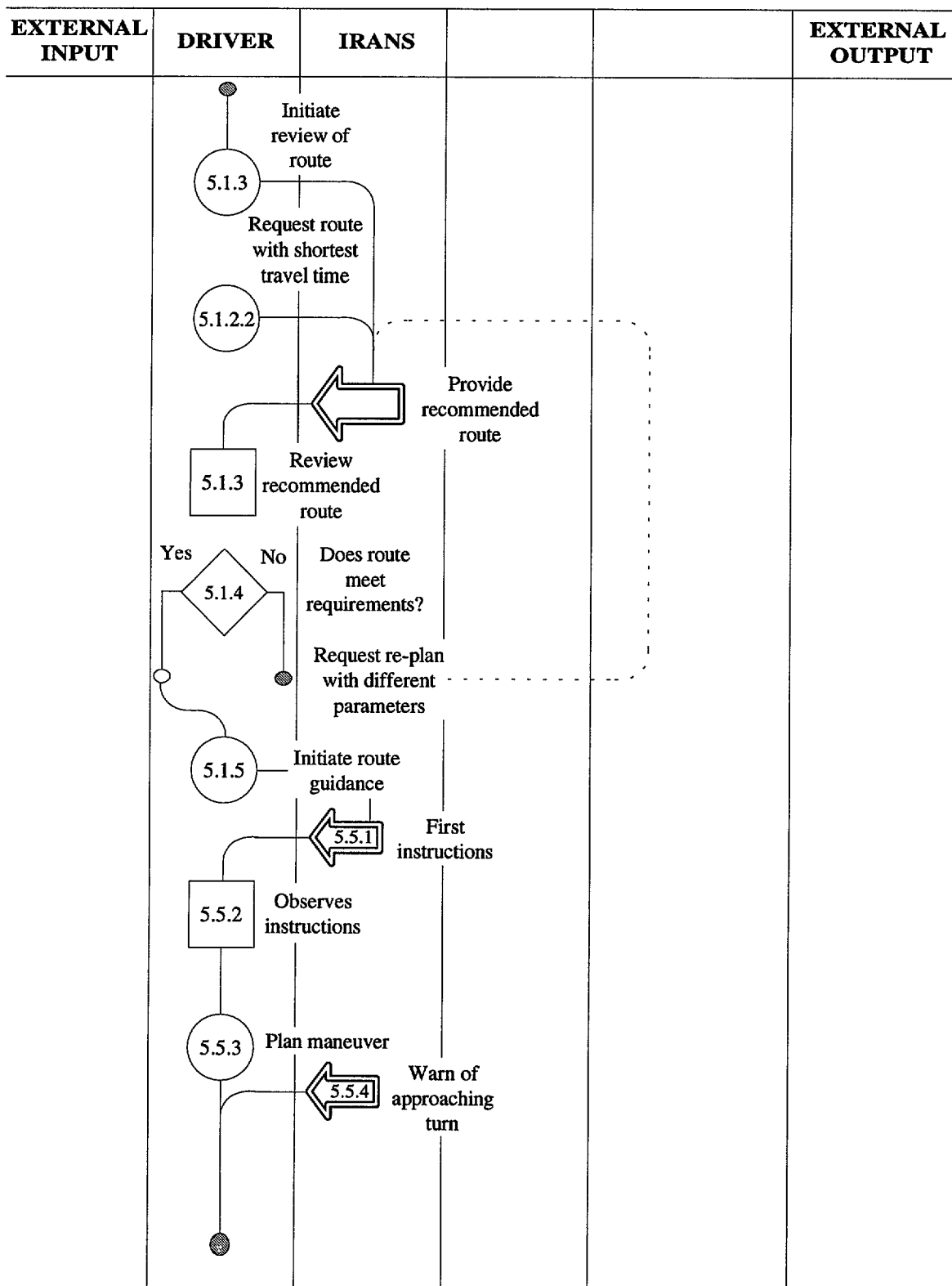


Figure 42. Operational sequence diagram for Scenario P2 (continued).

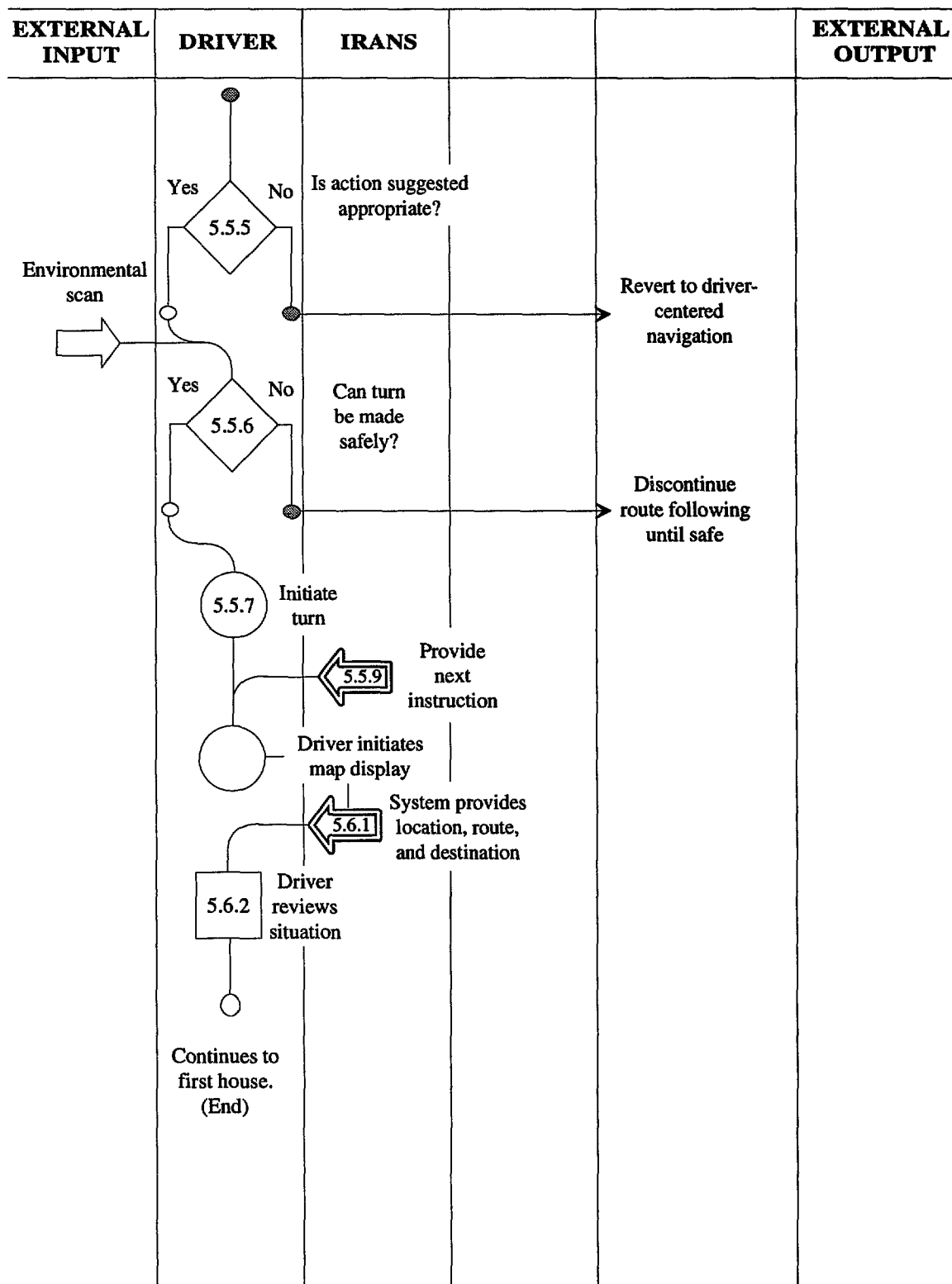


Figure 42. Operational sequence diagram for Scenario P2 (continued).

Table 61. Task characterization of Scenario P2.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
5.1.1.1	DESTINATION AND STOPPING POINTS	Narrow user considerations	System demand	DECIDE/SELECT	Adequate information for user to predict outcome.	
5.1.1.2	DESIRED ROUTE PARAMETERS	Narrow user considerations	System demand	DECIDE/SELECT	Adequate information for user to predict outcome.	
1.3.4.1	TURN ON	Invoke system operation	System demand	CONTROL	System provides indication that the system is responding to input.	
1.3.4.2	VERIFY SYSTEM READINESS	Evaluate system recommendation	Goal initiation	TEST	Recommendations in appropriate detail to identify compatibility with constraints.	
5.1.2.1	ENTER DESTINATION(S)	Provide system information	System demand	CODE	Input requirements compatible with knowledge. Input actions direct. Input actions do not exceed short-term memory.	
5.1.2.2	ROUTE PARAMETERS	Limit system considerations	Ensure input accuracy	CODE	Input requirements compatible with knowledge. Input actions directly. Input actions do not exceed short-term memory.	

Table 61. Task characterization of Scenario P2.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
UNCODED SYSTEM ACTIONS						
2.4.5.1	OPERATE BROADCAST RADIO/ ENTERTAINMENT SYSTEM	Invoke system operation	Goal initiation	INTERPRET	Information presented must be consistent with user's knowledge base.	
5.1.3	REVIEW RECOMMENDED ROUTE	Understand system/ environmental information	System demand	CONTROL	System provides indication of responding to input.	Initiate review of route, point by point.
5.1.2.2	ROUTE PARAMETERS	Limit system considerations	Ensure input accuracy	CODE	Input requirements directly.	
UNCODED SYSTEM ACTIONS						
5.1.3	REVIEW RECOMMENDED ROUTE	Understand system/ environmental information	System demand	INTERPRET	Information presented must be consistent with user's knowledge base. Information presented must be consistent with user's understanding of system goals.	
5.1.4	DECIDE IF ROUTE IS ACCEPTABLE	Evaluate system recommendation	Completion of previous step	DECIDE/ SELECT	Adequate information for user to predict outcome. Recommendations consistent with driver's experience. Recommendations don't violate known conditions or limitations.	

Table 61. Task characterization of Scenario P2.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.1.5	INITIATE SYSTEM APPROVAL	Approve system output and initiate next step	Change of goals	CONTROL	System provides indication that the system is responding to input.	Bridging task from route planning to route guidance.
5.5.1	SYSTEM GENERATES INSTRUCTION	Invoke system operation	Completion of previous step	CODE		Automatic system action.
5.5.2	DRIVER OBSERVES INSTRUCTION FOR NEXT ACTION	Understand system/environmental information	Completion of previous step	INTERPRET	Information presented must be consistent with user's knowledge base.	
5.5.3	DRIVER PLANS FOR NEXT ROUTE ACTION	Understand system/environmental information	Completion of previous step	PLAN	System provides necessary information.	
5.5.4	SYSTEM ALERTS DRIVER OF APPROACHING ACTION POINT	Invoke system operation	Completion of previous step	IDENTIFY		Automatic system action.
5.5.5	DRIVER CONFIRMS ACTION IS APPROPRIATE	Evaluate system recommendation	Completion of previous step	DECIDE/SELECT	Adequate information for user to predict outcome.	
5.5.6	DRIVER CONFIRMS THAT ACTION IS SAFE	Obtain environment information	Completion of previous step	DECIDE/SELECT	Adequate information for user to predict outcome.	Task is in response to needs of the primary task of driving.

Table 61. Task characterization of Scenario P2.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.5.7	DRIVER INITIATES NECESSARY ACTION	Execute system recommendation	Completion of previous step	CONTROL	Requirements don't exceed driver's response capabilities.	
5.5.9	SYSTEM GENERATES NEXT INSTRUCTION	Invoke system operation	Completion of previous step	CODE		Automatic system action.
UNCODED DRIVER ACTIONS						
5.6.1	SYSTEM PROVIDES NAVIGATION INFORMATION	Obtain system information	Completion of previous step	CODE		Automatic system action.
5.6.2	DRIVER OBSERVES NAVIGATION INFORMATION	Understand system/environmental information	Completion of previous step	INTERPRET	Information presented must be consistent with user's knowledge base.	
END OF SCENARIO						

Scenario P8

Purpose To illustrate that the requirements generated by ATIS may impose high workload demands on the driver.

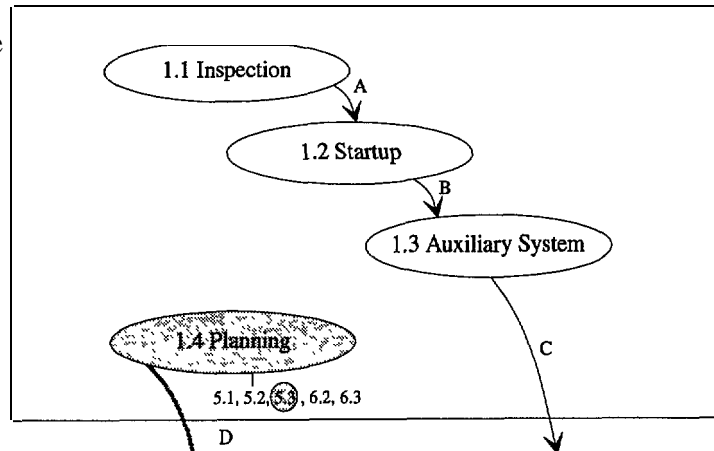
Summary A business traveler is driving in the suburbs of a major city that he is not familiar with, during a heavy snowstorm, at dinner time. He has selected a 20-mi (32.2km) drive, recommended by the ATIS, from his hotel to his first destination that is predominantly on arterial roads. In fact, the drive is not a straight line, but rather a series of turns to various arterial roads (no highways). The heavy snow is making visibility poor and the roads icy. He requests that the ATIS provide him with street signs and interchange graphics as well as stop signs and lane-use control information. Halfway to his destination, he is informed of an accident and of his need to select an alternate route. As he is examining two alternatives, the ATIS warns him of an approaching emergency vehicle. He slows down, pulls over, and enters his route choice. After the emergency vehicle passes, he continues traveling to his destination.

Function Interaction Diagram See figure 43.

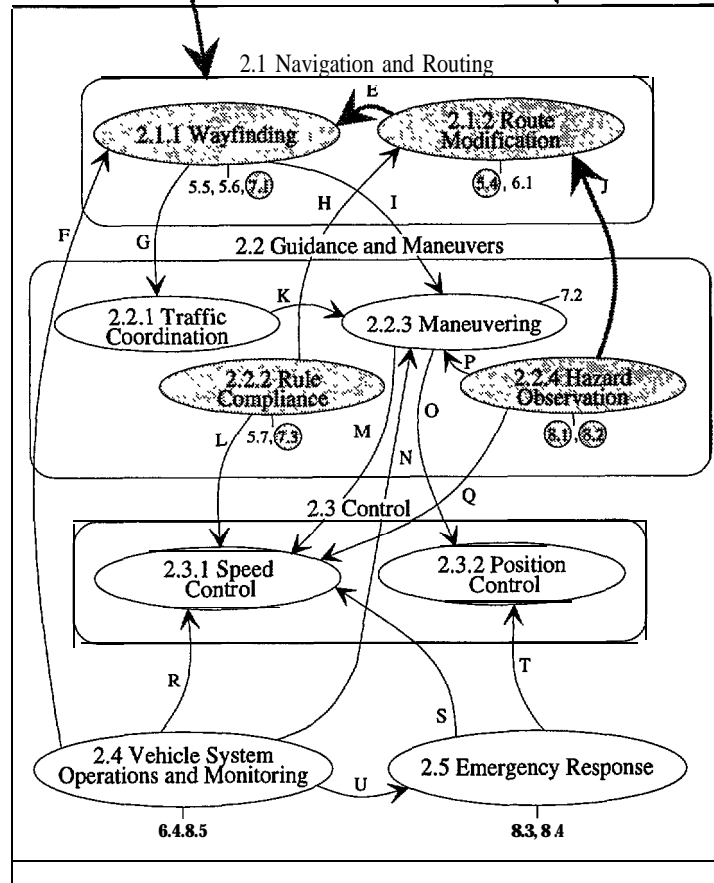
Operational Sequence Diagram See figure 44.

Task Characterization See table 62.

1. Pre-Drive



2. Drive



A Vehicle safety verified	I Maneuver required	O Requires change in lane position
B Vehicle initiated	J Potential hazards identified in upcoming roadway	P Hazard identified
C Auxiliary systems initiated	K Identification of safe path through traffic	Q Immediate hazard identified
D Destination and route selected	L Deviation from regulations	R Vehicle failure
E Route change identified	M Requires speed increase/decrease	S Conditions requiring immediate response
F Vehicle service required	N Failure requires change in speed/position	T Conditions requiring immediate response
G Maneuver required		U Minimize injury/damage
H Regulatory limits on roadway		

Figure 43. Function interaction diagram for Scenario PS.

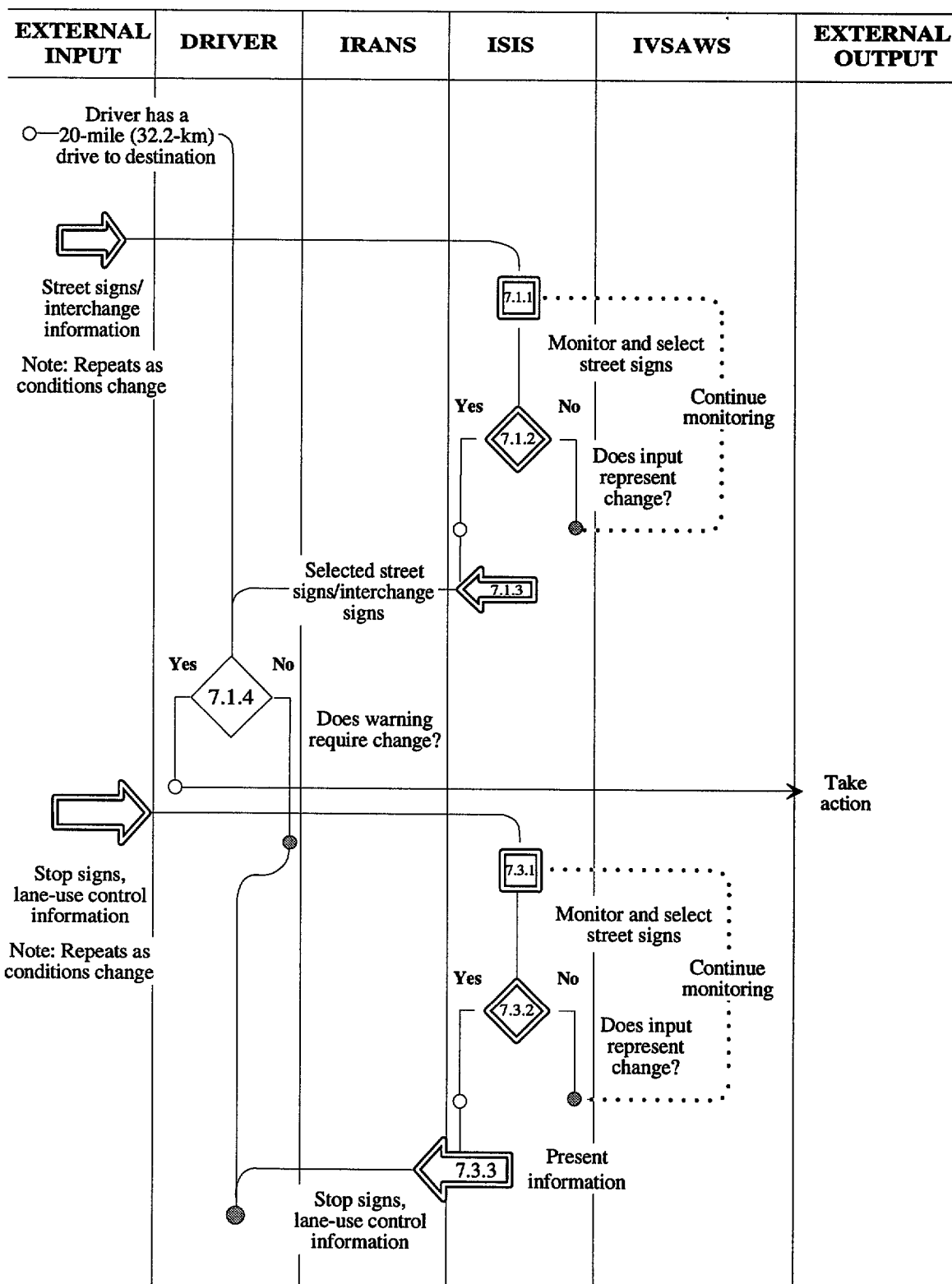


Figure 44. Operational sequence diagram for Scenario P8.

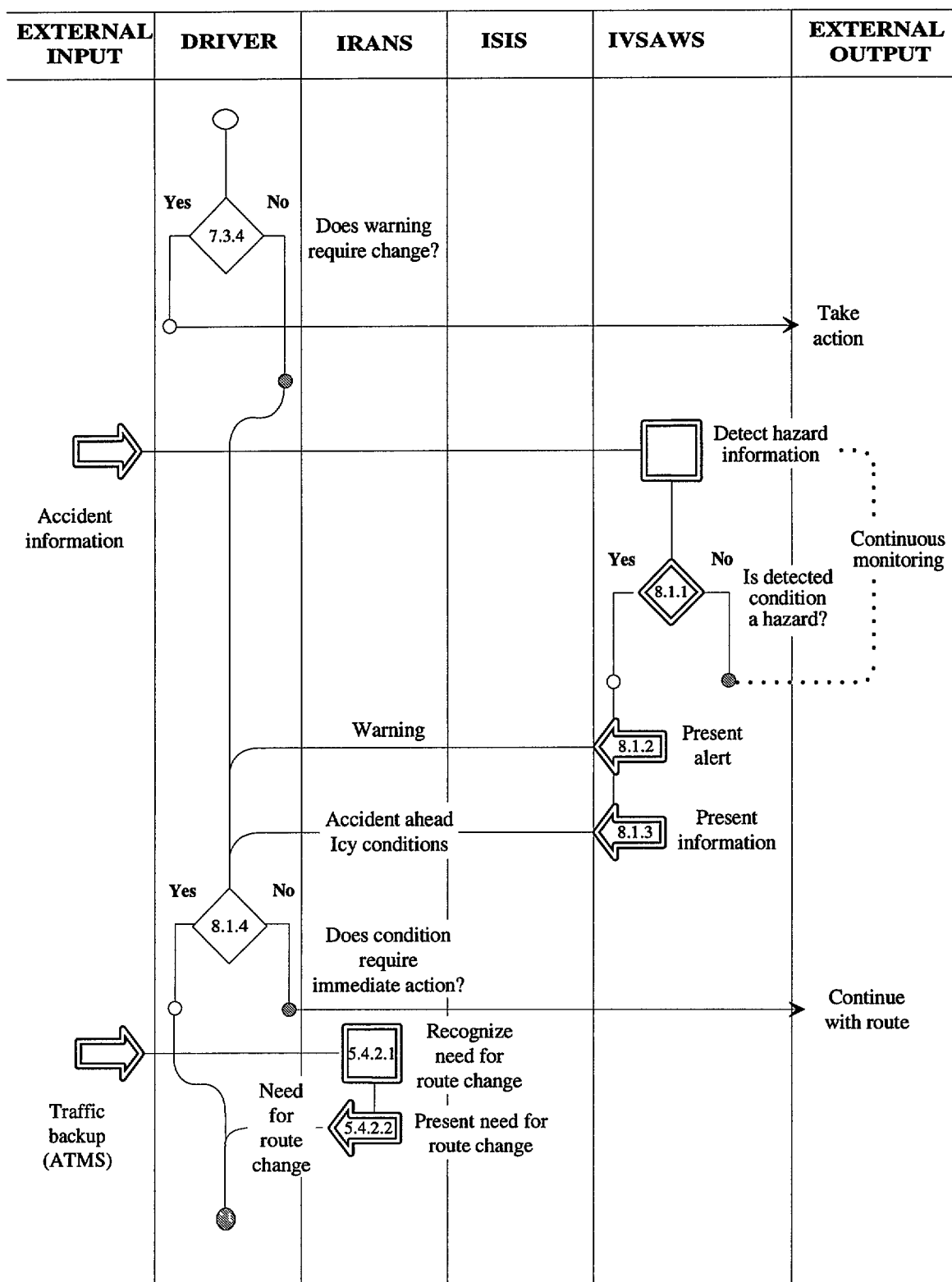


Figure 44. Operational sequence diagram for Scenario P8 (continued).

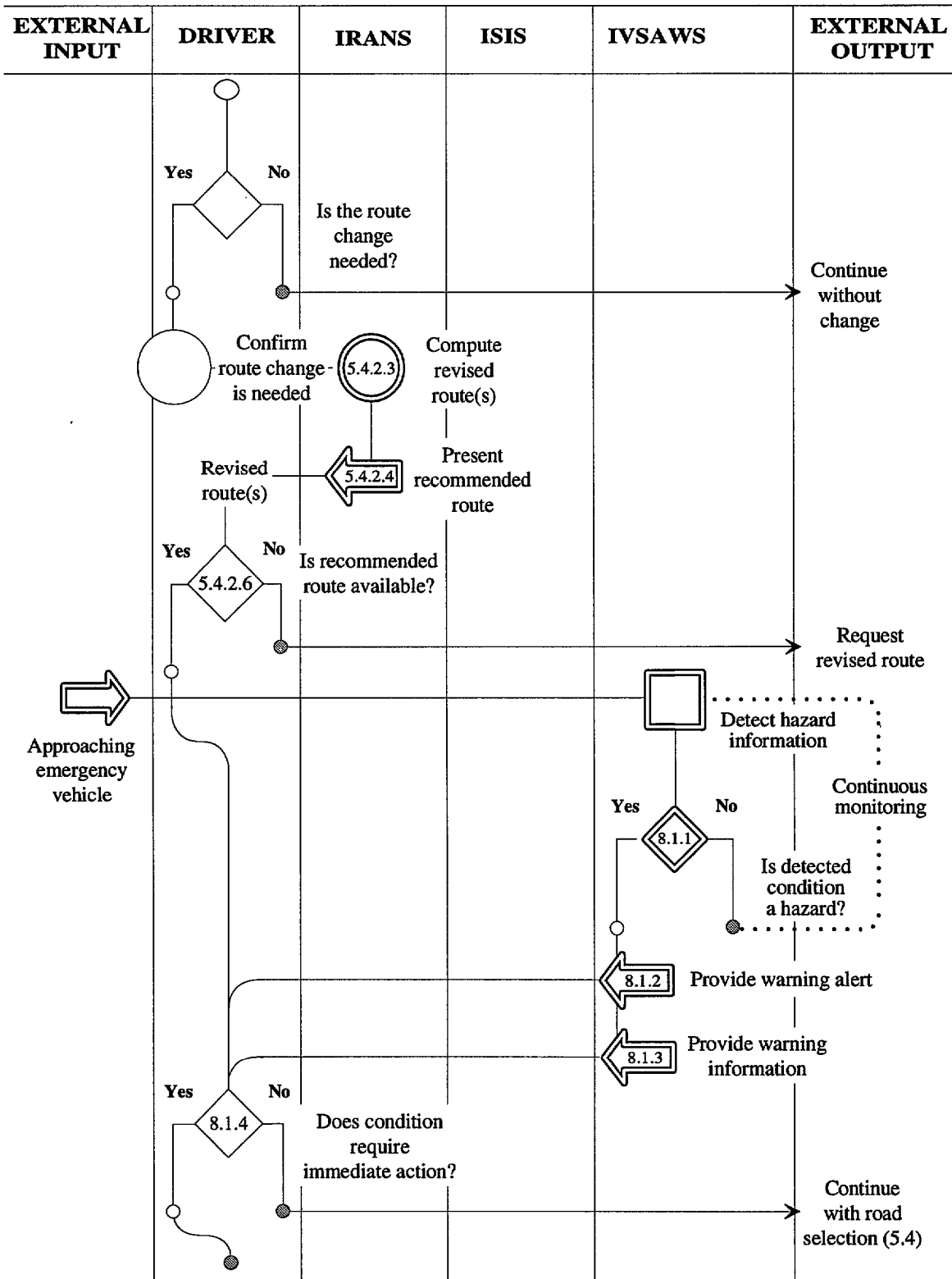


Figure 44. Operational sequence diagram for Scenario P8 (continued).

Table 62. Task characterization of Scenario P8.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
7.1.1	SYSTEM MONITORS ISIS INPUT	Automatic system operation	System demand	DETECT		Automatic system action.
7.1.2	SELECTS ROADWAY GUIDANCE SIGN INFORMATION	Automatic system operation	System demand	TEST		System action to match signal against parameters.
7.1.3	SYSTEM PRESENTS SELECTED SIGN INFORMATION	Obtain system information	Completion of previous step	CODE		Automatic system action.
7.1.4	DRIVER ACTS ON SIGN INFORMATION AS DESIRED	Understand system/ environmental information	Change of goals	DECIDE/SELECT	Recommendation consistent with driver's experience.	
7.3.1	SYSTEM MONITORS ISIS INPUT	Automatic system operation	System demand	DETECT		Automatic system action.
7.3.2	SELECTS ROADWAY REGULATORY SIGN INFORMATION	Automatic system operation	System demand	TEST		System matches received signal against present parameters.

Table 62. Task characterization of Scenario P8.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
7.3.3	SYSTEM PRESENTS SELECTED SIGN INFORMATION	Obtain system information	Completion of previous step	CODE		Automatic system action.
7.3.4	DRIVER ACTS ON SIGN INFORMATION AS DESIRED	Understand system/ environmental information	Change of goals	DECIDE/SELECT	Adequate information for driver to predict outcome.	
UNCODED SYSTEM ACTIONS						
3.1.1	SYSTEM DETECTS HAZARD NOTIFICATION	Automatic system operation	System demand	DETECT		Automatic system action.
3.1.2	SYSTEM ALERTS DRIVER OF HAZARD	Obtain system information	Completion of previous step	CODE		Automatic system action.
3.1.3	SYSTEM PROVIDES INFORMATION ON HAZARD TYPE	Automatic system operation	System demand	CODE		Automatic system action.
3.1.4	DRIVER TAKES APPROPRIATE ACTION IN RESPONSE TO HAZARD	Understand system/ environmental information	Change of goals	DECIDE/SELECT		Adequate information for driver to predict outcome.

Table 62. Task characterization of Scenario P8.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
4.2.1	SYSTEM RECOGNIZES NEED FOR REVISED ROUTE	Obtain environment information	Environmental change	COMPUTE		Automatic system action.
4.2.2	SYSTEM ALERTS DRIVER OF CHANGE IN ROUTE CONDITIONS	Obtain system information	Environmental change	CODE		Automatic system action.
UNCODED DRIVER ACTIONS						
4.2.3	SYSTEM COMPUTES REVISED ROUTE! RECOMMENDATION	Invoke system operation	Completion of previous step	COMPUTE		Automatic system action.
4.2.4	SYSTEM PRESENTS REVISED ROUTE	Obtain system information	Environmental change	CODE		Automatic system action.
4.2.6	DECIDES IF RECOMMENDED ROUTE IS SATISFACTORY	Verify output meets expectations	Completion of previous step	DECIDWSELECT	Adequate information for user to predict outcome. Recommendations consistent with driver's experience. Recommendations don't violate known conditions or limitations.	

Table 62. Task characterization of Scenario PS.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
UNCODED SYSTEM ACTIONS						
1.1.1	SYSTEM DETECTS HAZARD NOTIFICATION	Automatic system operation	System demand	DETECT		Automatic system action.
1.1.2	SYSTEM ALERTS DRIVER OF HAZARD	Obtain system information	Completion of previous step	CODE		Automatic system action.
1.1.3	SYSTEM PROVIDES INFORMATION ON HAZARDTYPE	Automatic system operation	System demand	CODE		Automatic system action.
8.1.4	DRIVER TAKES APPROPRIATE ACTION IN RESPONSE TO HAZARD	Understand system/ environmental information	Change of goals	DECIDE/SELECT	Adequate information for user to predict outcome. Recommendations consistent with driver's experience. Recommendations don't violate known conditions or limitations.	
2.3.1.2	ADJUST THROTTLE OR BRAKE TO CONTROL SPEED	Modify system operation	System demand	CONTROL	Requirements don't exceed driver's response capabilities.	

Table 62. Task characterization of Scenario PS.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
2.3.2.2	ADJUST STEERING WHEEL TO COMPENSATE	Modify system operation	System demand	CONTROL	Requirements don't exceed driver's response capabilities.	
2.3.1.2	ADJUST THROTTLE OR BRAKE TO CONTROL SPEED	Modify system operation	System demand	CONTROL	Requirements don't exceed driver's response capabilities.	
5.4.2.7	INITIATE ROUTE APPROVAL	Approve system output and initiate next step	Completion of previous step	CONTROL	System provides indication that the system is responding to input.	
5.5	ROUTE GUIDANCE	Obtain system information	Goal initiation	CODE		Automatic system action.
UNCODED SYSTEM ACTIONS						
5.5.8	DRIVER COMPLETES NECESSARY ACTION	Make a system ready to use	Completion of previous step	CONTROL	Requirements don't exceed driver's response capabilities.	
END OF SCENARIO						

COMMERCIAL SCENARIOS

Scenario C12

Purpose To illustrate the functional characteristic that had the greatest frequency count (dynamic route selection) and the one that was considered the most central (dispatch).

Summary It is Friday evening, during rush hour traffic, just before a holiday. The commute is slow because it is snowing and several accidents obstruct traffic circulation. A central dispatcher for medical aid vehicles in a large metropolitan area is working her normal evening shift. She receives two concurrent emergency calls for aid required at a freeway accident and a private residence. The dispatcher enters the locations of the emergencies into her routing system and the system determines the appropriate medical aid vehicle stations to call and the appropriate routes to take, based on the fastest predicted travel time under current traffic and road conditions. Upon receipt of that information, she informs the appropriate drivers of the new destination and route to take. The drivers enter the routing into their ATIS and activate IVSAWS to provide them with updated road condition information. As one of the drivers is driving to the residential call, he is informed of severe icing along the route. He requests a route change from his ATIS and continues to the residence.

Function Interaction Diagram See figure 45.

Operational Sequence Diagram See figure 46.

Task Characterization See table 63.

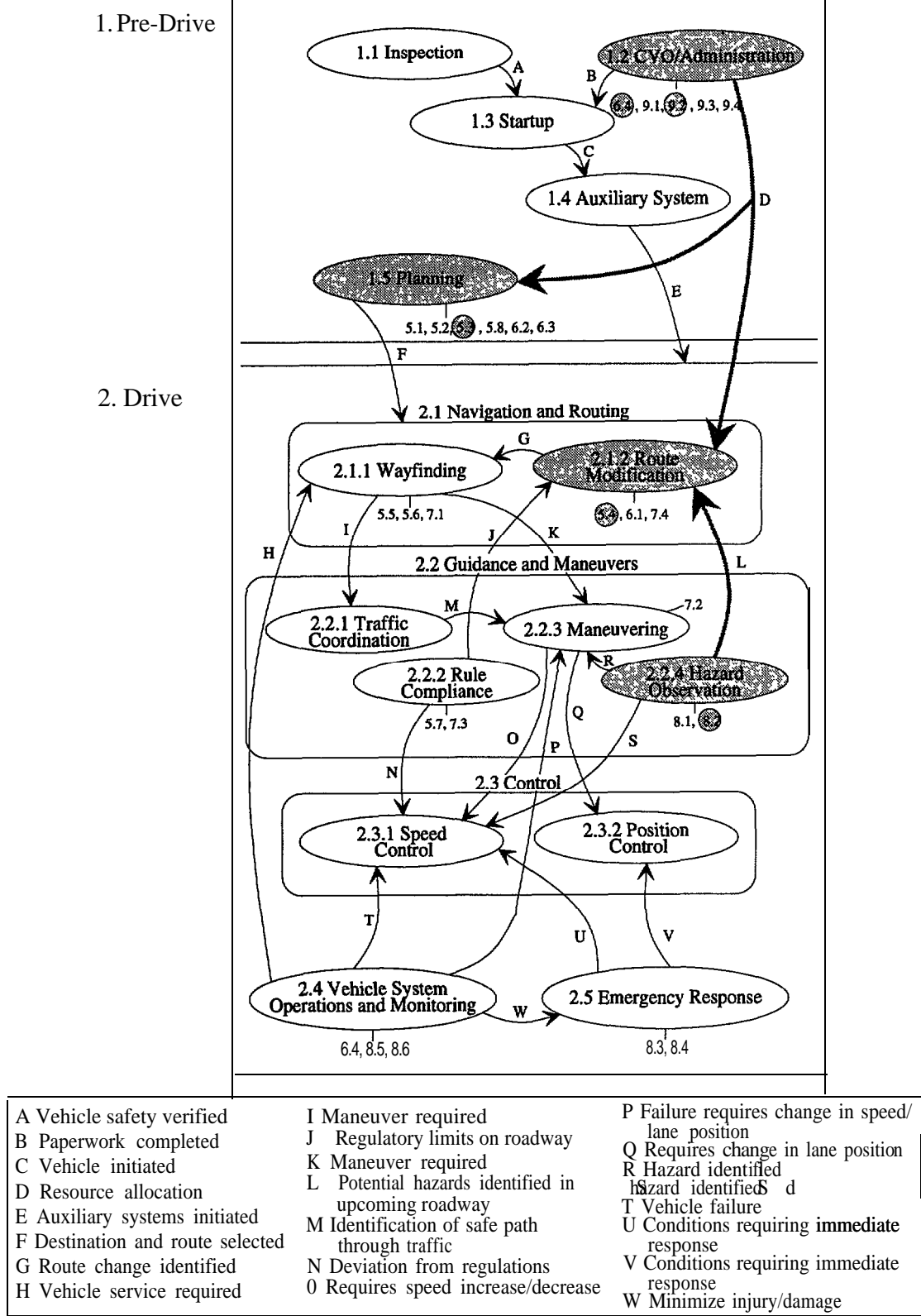


Figure 45. Function interaction diagram for Scenario C12.

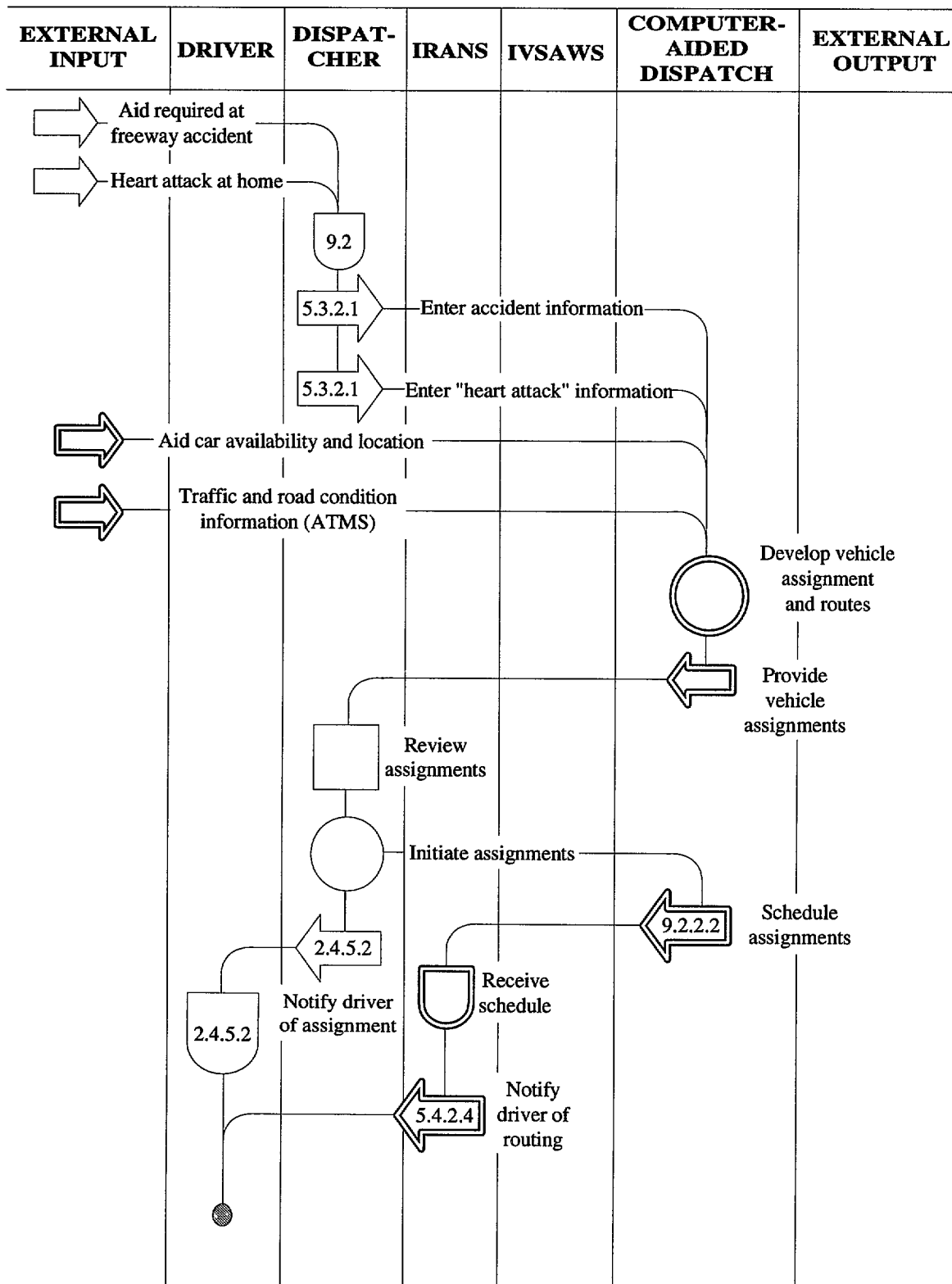


Figure 46. Operational sequence diagram for Scenario C12.

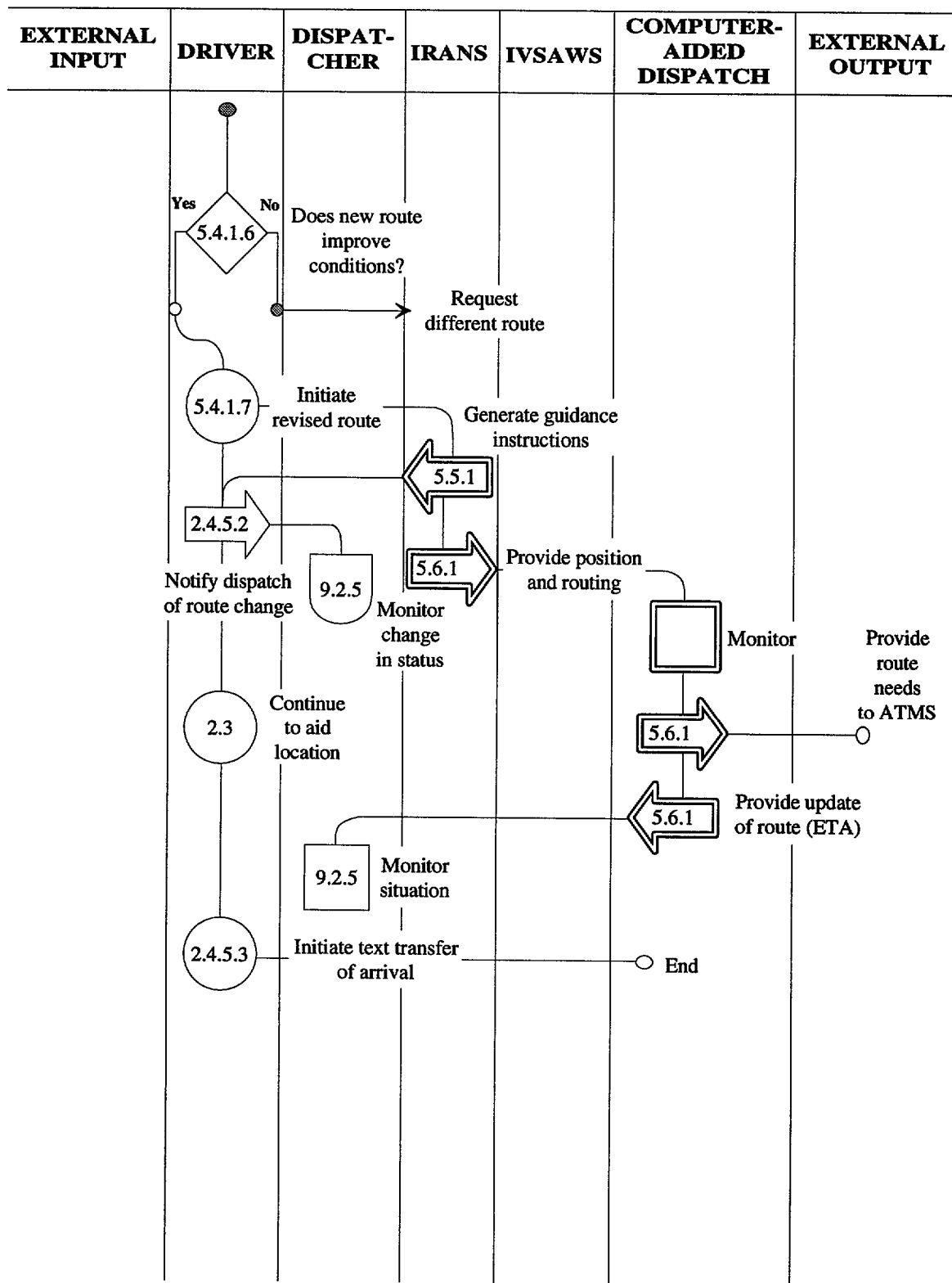


Figure 46. Operational sequence diagram for Scenario C12 (continued).

Table 63. Task characterization of Scenario C12.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
9.2	DISPATCH	Manually execute system functions	Goal initiation	CODE	System input requirements consistent with user's knowledge base.	
5.3.2.1	DESTINATION	Provide system information	System demand	CODE	System input requirements consistent with user's knowledge base.	First aid request .
5.3.2.1	DESTINATION	Provide system information	System demand	CODE	System input requirements consistent with user's knowledge base.	Second aid request.
UNCODED DISPATCHER ACTIONS						
2.4.5.2	OPERATE TWO-WAY COMMUNICATIONS (AUDIO)	Invoke system operation	Goal initiation	CODE	System input requirements must not require user translation.	
9.2.2.2	SCHEDULE ROUTE	Evaluate system recommendation	Completion of previous step	CODE		Automatic system action.

Table 63. Task characterization of Scenario C12.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
UNCODED SYSTEM ACTIONS''						
5.4.2.4	SYSTEM PRESENTS REVISED ROUTE	Evaluate system recommendation	Completion of previous step	CODE	Recommendations in appropriate detail to identify compatibility with constraints.	Automatic system action.
1.3.4.3	INITIATE SYSTEM OPERATION	Invoke system operation	System demand	CONTROL	System must provide driver with indication that the system is responding.	
3.2.1	SYSTEM DETECTS ROAD CONDITION NOTIFICATION	Automatic system operation	System demand	DETECT		Automatic system action.
3.2.3	SYSTEM PROVIDES INFORMATION ON ROAD CONDITION	Automatic system operation	System demand	CODE		Automatic system action.
2.4.6.4	MONITORING IVSAWS WARNING	Obtain system information	Environmental change	IDENTIFY	Information presented must be consistent with user's knowledge base.	
3.2.4	DRIVER TAKES APPROPRIATE ACTION IN RESPONSE TO ROAD CONDITION	Understand system/ environmental information	Change of goals	CONTROL	System provides indication that the system is responding to input.	Automatic system action.
5.4.1.3	SYSTEM COMPUTES NEW ROUTE	Invoke system operation	Completion of previous step	COMPUTE		Automatic system action.

Table 63. Task characterization of Scenario C12.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.4.1.4	SYSTEM PRESENTS REVISED ROUTE	Obtain system information	Completion of previous step	CODE		Automatic system action.
5.4.1.6	DECIDES IF RECOMMENDED ROUTE IS SATISFACTORY	Verify output meets expectations	Completion of previous step	DECIDE/SELECT	Adequate information for user to predict outcome. Recommendations consistent with driver's experience. Recommendations don't violate known conditions or limitations.	
5.4.1.7	INITIATE ROUTE APPROVAL	Approve system output and initiate next step	Completion of previous step	CONTROL	System provides indication that the system is responding to input.	
5.5.1	SYSTEM GENERATES INSTRUCTION	Invoke system operation	Completion of previous step	CODE		Automatic system action.
5.6.1	SYSTEM PROVIDES NAVIGATION INFORMATION	Obtain system information	Completion of previous step	CODE		Automatic system action.

Table 63. Task characterization of Scenario C12.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
UNCODED SYSTEM ACTIONS						
9.2.5	SUPERVISING	Obtain system information	Completion of previous step	MONITOR	System must provide dispatcher indication of present state. System must provide dispatcher indications of progress toward planning goal.	
2.4.5.2	OPERATE TWO-WAY COMMUNICATIONS (AUDIO)	Invoke system operation	Goal initiation	CODE	Input requirements directly. Input actions do not exceed short-term memory.	
9.2.5	SUPERVISING	Obtain system information	Change in environment	MONITOR	System must provide dispatcher indication of present state. System must provide dispatcher indications of progress toward planning goal.	
2.3	CONTROL	Manual execution of system function	System requirement	CONTROL	System requirements do not exceed driver's response capabilities.	
2.4.5.3	OPERATE TWO-WAY COMMUNICATIONS (TEXT)	Invoke system operation	Goal initiation	CODE	Input requirements directly.	
END OF SCENARIO						

Scenario C13

Purpose To illustrate a grouping of functional characteristics from Cluster 1 (5.3, 5.8, 6.3, 6.4, 8.2, 9.1, and 9.2).

Summary A central dispatcher coordinates the progress of 20 separate vans that provide door-to-door airport transportation in one suburban section of a major metropolitan area. Service is provided on demand so that calls are responded to within a specified period of time. If the caller is not picked up within the specified time, the cost of the ride is reduced by 50 percent and a report must be filed by the driver and dispatcher. A dispatcher is also rewarded for making the maximum use of available vans, as determined by the fleet routing system. The dispatcher prepares the first pickup schedule of the day and transmits this information to the drivers.

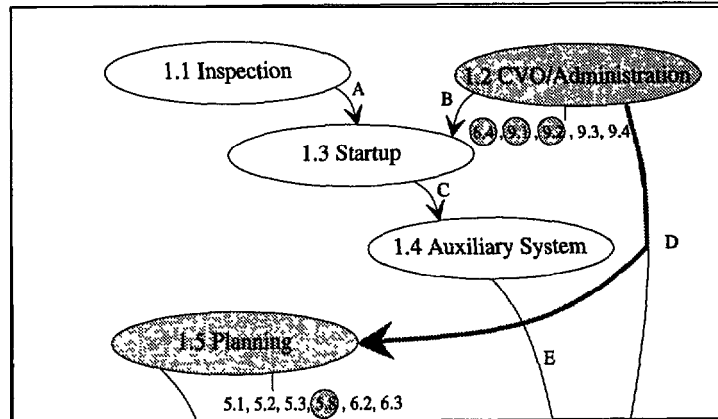
Function Interaction Diagram See figure 47.

Operational Sequence Diagram See figure 48.

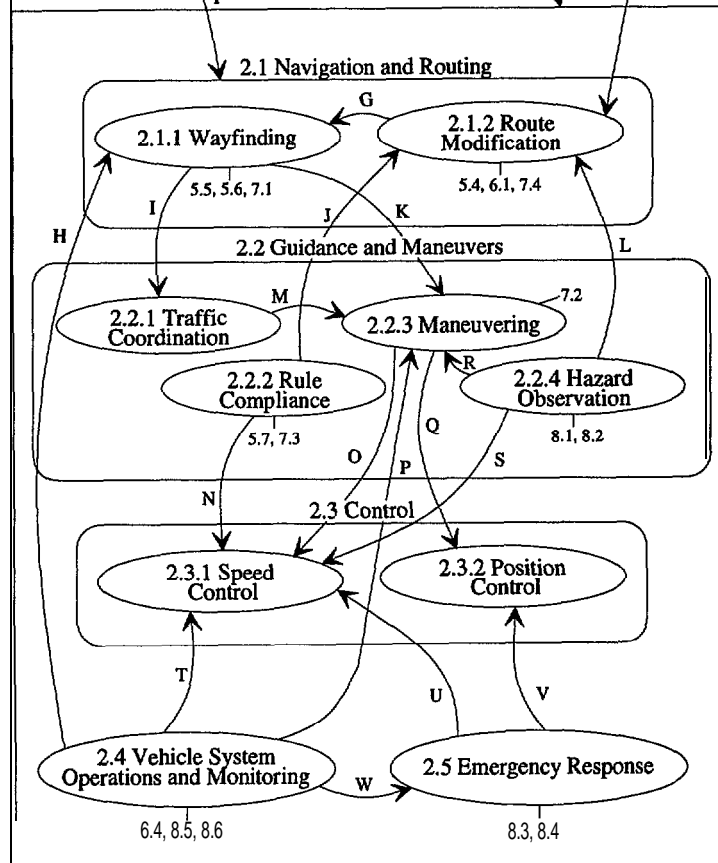
Task Characterization See table 64.



1. Pre-Drive



2. Drive



A Vehicle safety verified	I Maneuver required	P Failure requires change in speed
B Paperwork completed	J Regulatory limits on roadway	lane position
C Vehicle initiated	K Maneuver required	Q Requires change in lane position
D Resource allocation	L Potential hazards identified in	R Hazard identified
E Auxiliary systems initiated	upcoming roadway	S Immediate hazard identified
F Destination and route selected	M Identification of safe path	T Vehicle failure
G Route change identified	through traffic	U Conditions requiring immediate
H Vehicle service required	N Deviation from regulations	response
	O Requires speed increase/decrease	V Conditions requiring immediate
		response
		W Minimize injury/damage

Figure 47. Function interaction diagram for Scenario C13.

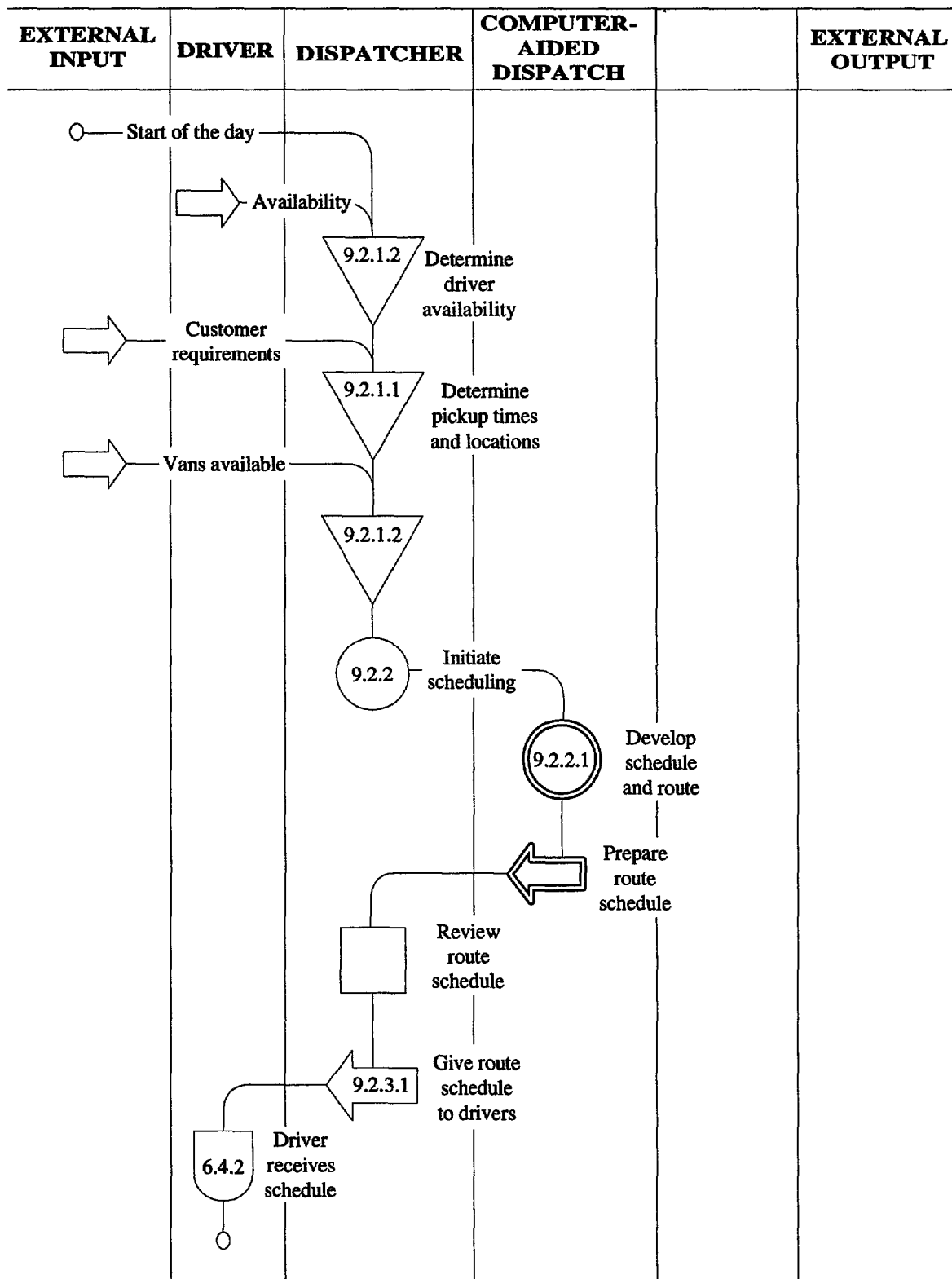


Figure 48. Operational sequence diagram for Scenario C13.

Table 64. Task characterization of Scenario C13.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
9.2.1.2	GATHER INFORMATION ON RESOURCE AVAILABILITY	Provide system information	Goal initiation	INTERPRET	Information presented must be consistent with user's knowledge base.	
9.2.1.1	GATHER INFORMATION ON RESOURCE REQUIREMENTS	Provide system information	Goal initiation	INTERPRET	Information presented must be consistent with user's knowledge base.	
9.2.2	SCHEDULING	Invoke system operation	System demand	CONTROL	System provides indication that system is responding to input.	
9.2.2.1	SCHEDULE SHIPMENT PICKUP AND DELIVERY	Automatic system operation.	Completion of previous step	COMPUTE		Automatic system action.
UNCODED DISPATCHER ACTIONS						
9.2.3.1	COORDINATE DRIVERS' ACTIVITIES	Provide system information	Goal initiation	CODE	System output requirements must not require user interpretation.	
6.4.2	MESSAGE RECEIVED BY VEHICLE	Obtain system information	Goal initiation			
END OF SCENARIO						

Scenario C4

Purpose To illustrate a grouping of the functional characteristics found in Cluster 2 (5.4, 5.6, 7.1, 7.2, and 8.1).

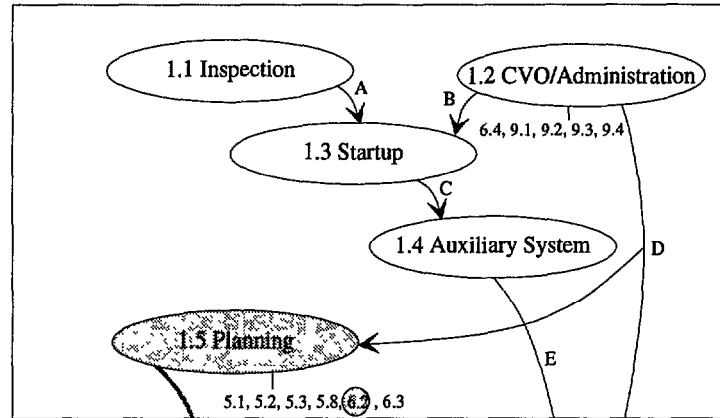
Summary A young interstate truck operator is traveling at night on a narrow, two-lane road. As he is traveling, his IVSAWS provides advance warning of the road closure due to a new construction zone ahead. Because the road closure occurs just prior to a planned refueling stop, the driver uses his ATIS to determine the nearest service station. Having selected one, he requests a dynamic route change to proceed to the station and the help of the ISIS to provide speed-limit transitions, street signs, and merge signs.

Function Interaction Diagram See figure 49.

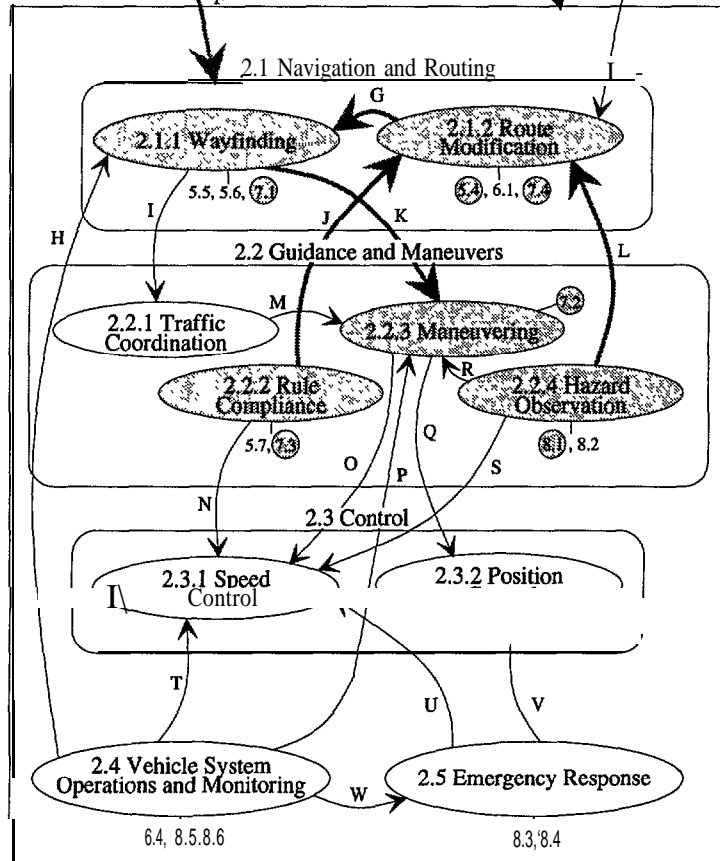
Operational Sequence Diagram See figure 50.

Task Characterization See table 65.

1. Pre-Drive



2. Drive



A Vehicle safety verified	I Maneuver required	P Failure requires change in speed/ lane position
B Paperwork completed	J Regulatory limits on roadway	Q Requires change in lane position
C Vehicle initiated	K Maneuver required	R Hazard identr
D Resource allocation	L Potential hazards identified in upcoming roadway	S Immediate hazard identified
E Auxiliary systems initiated	M Identification of safe path through traffic	T Vehicle failure
F Destination and route selected	N Deviation from regulations	U Conditions requiring immediate response
G Route change identified	O Requires speed increase/decrease	V Conditions requiring immediate response
H Vehicle service required		W Minimize injury/damage

Figure 49. Function interaction diagram for Scenario C4.

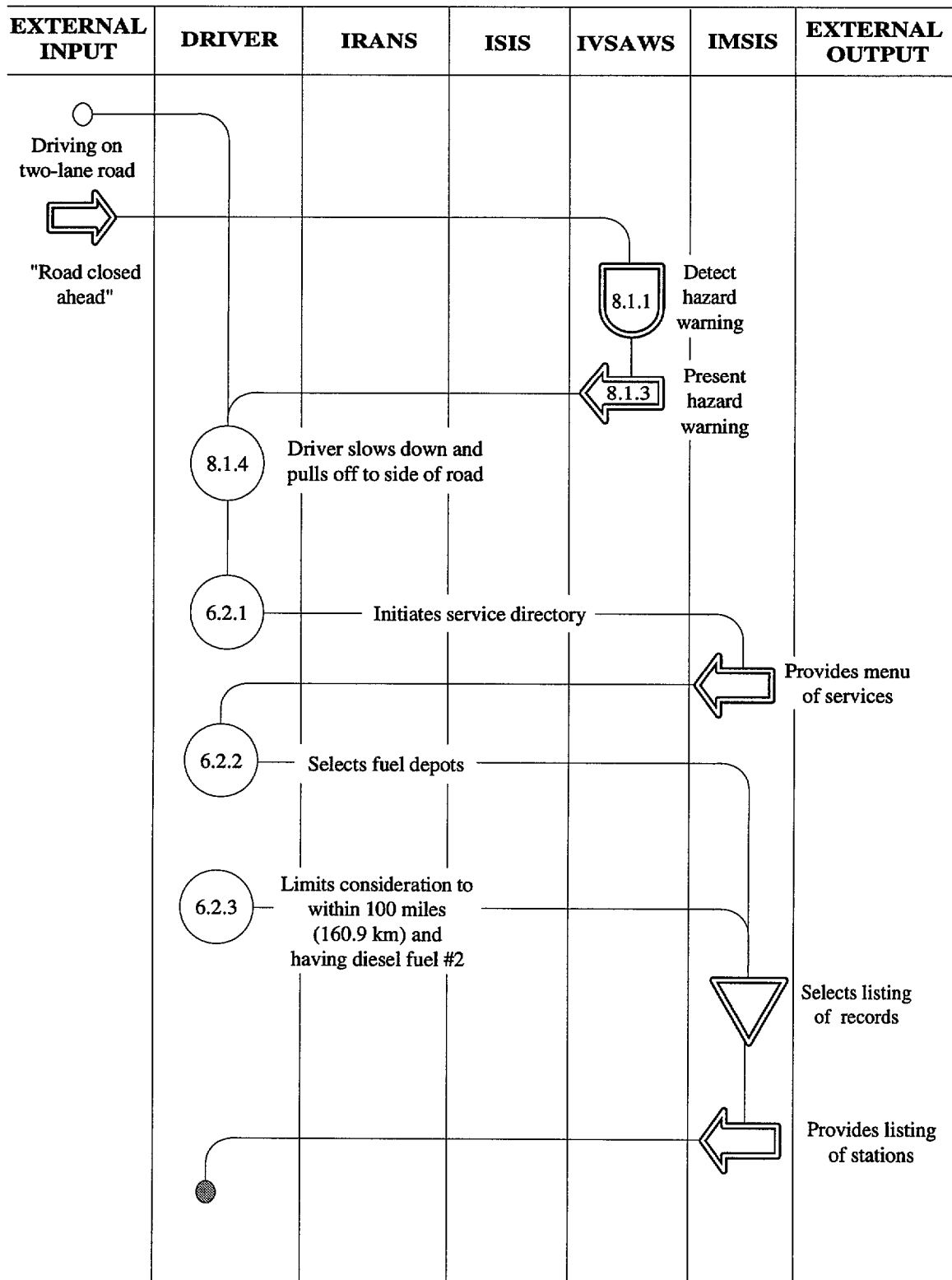


Figure 50. Operational sequence diagram for Scenario C4.

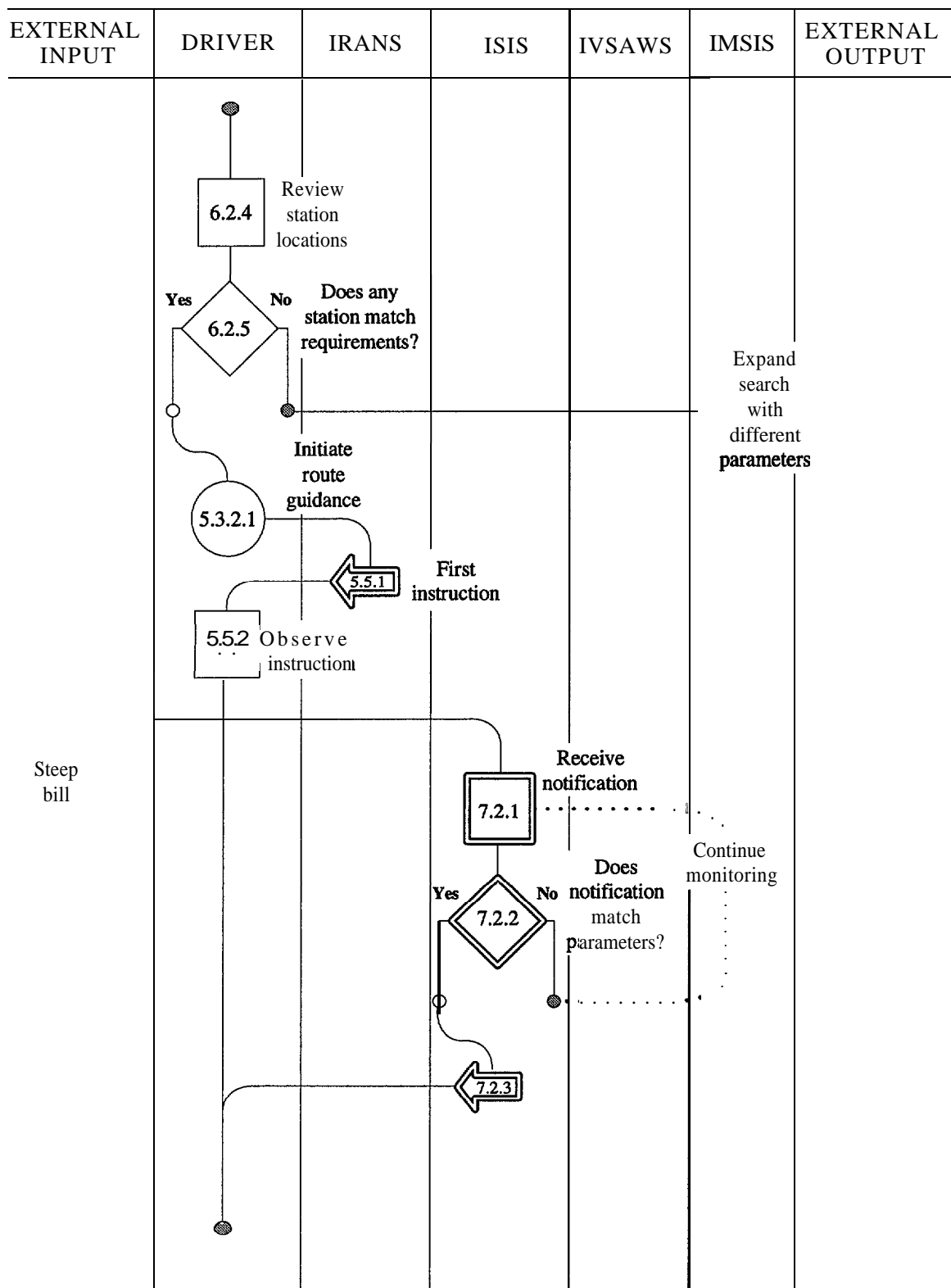


Figure 50. Operational sequence diagram for Scenario C4 (continued).

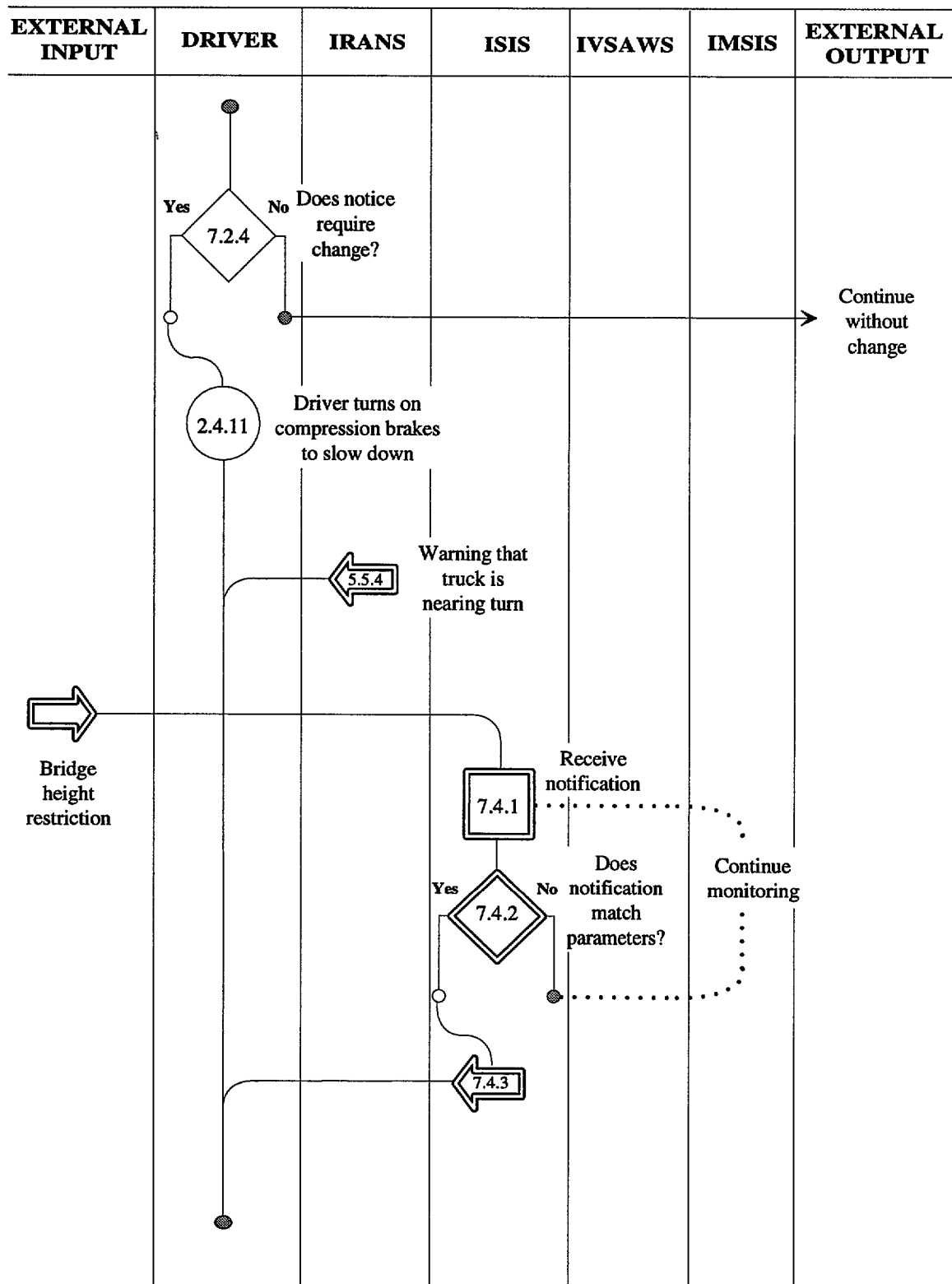


Figure 50. Operational sequence diagram for Scenario C4 (continued).

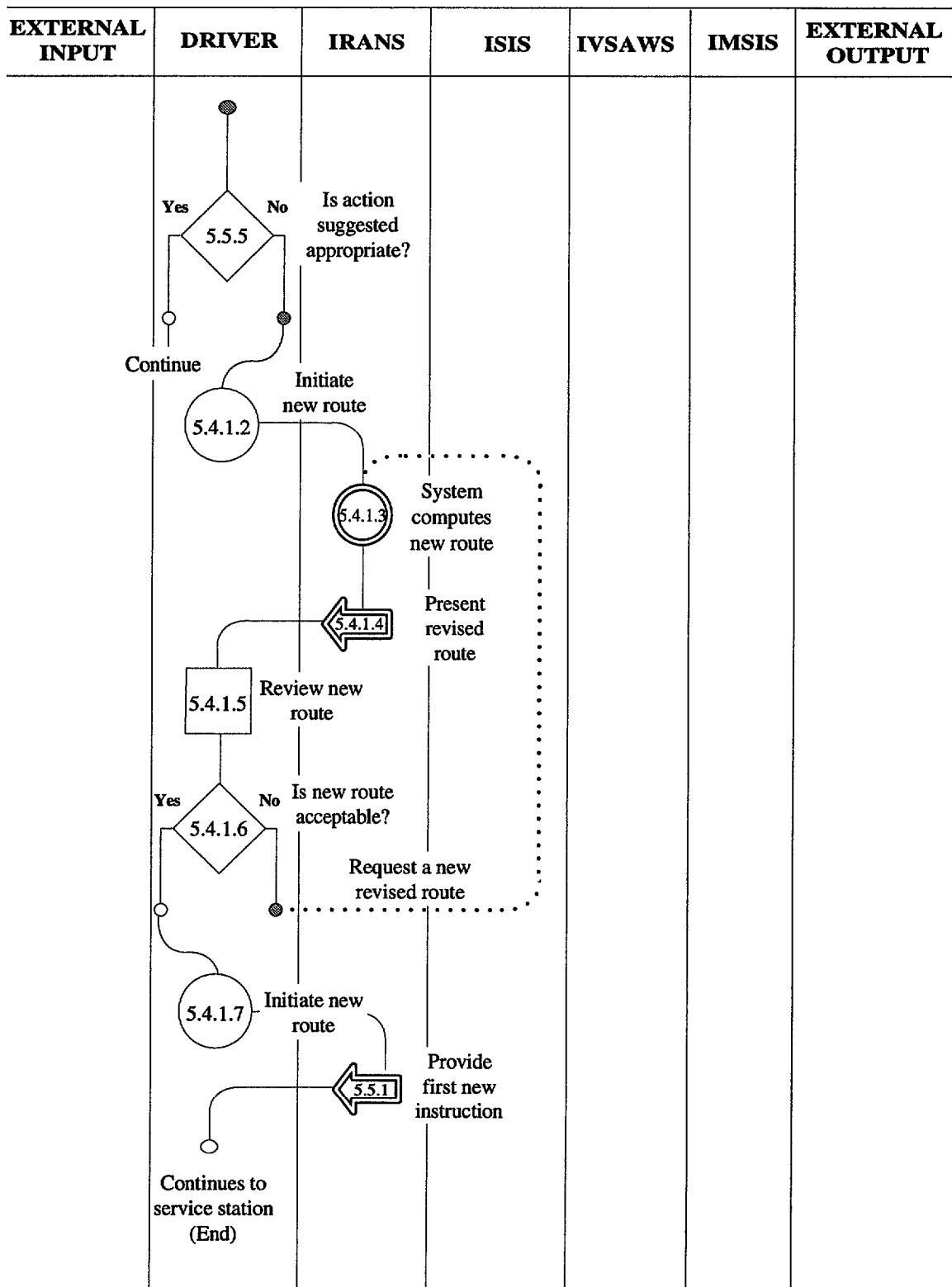


Figure 50. Operational sequence diagram for Scenario C4 (continued).

Table 65. Task characterization of Scenario C4.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
8.1.1	SYSTEM DETECTS HAZARD NOTIFICATION	Automatic system operation	System demand	DETECT		Automatic system action.
8.1.3	SYSTEM PROVIDES INFORMATION ON HAZARD TYPE	Automatic system operation	System demand	CODE		Automatic system action.
8.1.4	DRIVER TAKES APPROPRIATE ACTION IN RESPONSE TO HAZARD	Understand system/ environmental information	Change of goals	CONTROL	Requirements don't exceed driver's response capabilities.	
6.2.1	DRIVER INITIATES SERVICES/ ATTRACTIONS DIRECTORY	Make system ready to use	Goal initiation	CONTROL	System provides indication that the system is responding to input.	
UNCODED SYSTEM ACTIONS						
6.2.2	SELECT CLASS OF SERVICES DESIRED	Limit system considerations	System demand	CODE	Input requirements directly.	

Table 65. Task characterization of Scenario C4.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
6.2.3	SELECT PARAMETERS FOR CLASS OF SERVICES	Limit system considerations	System demand	CODE	Input requirements compatible with user's knowledge. Input requirements directly.	
UNCODED SYSTEM ACTIONS						
6.2.4	REVIEW LISTING	Obtain system information	Completion of previous step	SEARCH	Information presentation must not exceed short-term memory capabilities. Information presented must be consistent with user's knowledge base.	
6.2.5	SELECT ITEM FROM LISTING	Approve system output and initiate next step	Completion of previous step	DECIDE/SELECT	System must provide adequate information for user to predict outcome.	
5.3.2.1	DESTINATION	Provide system information	System demand	CONTROL	System provides indication that system is responding to input.	Task moves destination information from IMSIS to IRANS
5.5.1	SYSTEM GENERATES INSTRUCTION	Invoke system operation	Completion of previous step	CODE		Automatic system action.

Table 65. Task characterization of Scenario C4.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.5.2	DRIVER OBSERVES INSTRUCTION FOR NEXT ACTION	Understand system/environmental information	Completion of previous step	INTERPRET	Information presented must be consistent with user's knowledge base. Information presented must be consistent with user's understanding of system goals.	
7.2.1	SYSTEM MONITORS ISIS INPUT	Automatic system operation	System demand	DETECT		Automatic system action.
7.2.2	SELECTS ROADWAY NOTIFICATION SIGN INFORMATION	Automatic system operation	System demand	TEST		System matches received signal against preset parameters. Automatic system action.
7.2.3	SYSTEM PRESENTS SELECTED SIGN INFORMATION	Obtain system information	Completion of previous step	CODE		Automatic system action.
7.2.4	DRIVER ACTS ON SIGN INFORMATION AS DESIRED	Understand system/environmental information	Change of goals	DECIDE/SELECT	System must provide adequate information for user to predict outcome.	

Table 65. Task characterization of Scenario C4.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
2.4.11	USE ENGINE RETARDER AND COMPRESSION BRAKES	Invoke system operation	Change in environment	CONTROL	Requirements don't exceed driver's response capabilities.	
5.5.4	SYSTEM ALERTS DRIVER OF APPROACHING ACTION POINT	Invoke system operation	Completion of previous step	CODE		Automatic system action.
7.4.1	SYSTEM MONITORS CVO REGULATORY INFORMATION	Make system ready to use	Goal initiation	MONITOR		Automatic system action.
7.4.2	SYSTEM SELECTS CVO REGULATORY INFORMATION	Understand system/environmental information	Changes in environment	TEST		Automatic system action.
7.4.3	SYSTEM PRESENTS CVO REGULATORY INFORMATION	Provide system information	Completion of previous step	CODE		Automatic system action.
5.5.5	DRIVER CONFIRMS ACTION IS APPROPRIATE	Evaluate system recommendation	Completion of previous step	DECIDE/SELECT		System must provide adequate information for user to predict outcome.

Table 65. Task characterization of Scenario C4.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.4.1.2	INITIATE NEW ROUTE REQUEST OF IRANS	Provide system information	Completion of previous step	CONTROL	System provides indication that the system is responding to input.	
5.4.1.3	SYSTEM COMPUTES NEW ROUTE	Invoke system operation	Completion of previous step	COMPUTE		Automatic system action.
5.4.1.4	SYSTEM PRESENTS REVISED ROUTE	Obtain system information	Completion of previous step	CODE		Automatic system action.
5.4.1.5	DRIVER REVIEWS RECOMMENDED ROUTE	Evaluate system recommendation	Completion of previous step	TEST	Recommendations in appropriate detail to identify compatibility with constraints. Recommendations compatible with short-term memory. Level of detail does not increase workload.	

Table 65. Task characterization of Scenario C4.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
5.4.1.6	DECIDES IF RECOMMENDED ROUTE IS SATISFACTORY	Verify output meets expectations	Completion of previous step	DECIDE/SELECT	Adequate information for user to predict outcome. Recommendations consistent with driver's experience. Recommendations don't violate known conditions or limitations.	
5.4.1.7	INITIATE ROUTE APPROVAL	Approve system output and initiate next step	Completion of previous step	CONTROL	System provides indication that the system is responding to input.	
5.5.1	SYSTEM GENERATES INSTRUCTION	Invoke system operation	Completion of previous step	CODE		Automatic system action.
END OF SCENARIO						

Scenario C11

Purpose To illustrate a grouping of functional characteristics from Cluster 3 (5.1, 5.2, 5.7, 9.3, and 9.4).

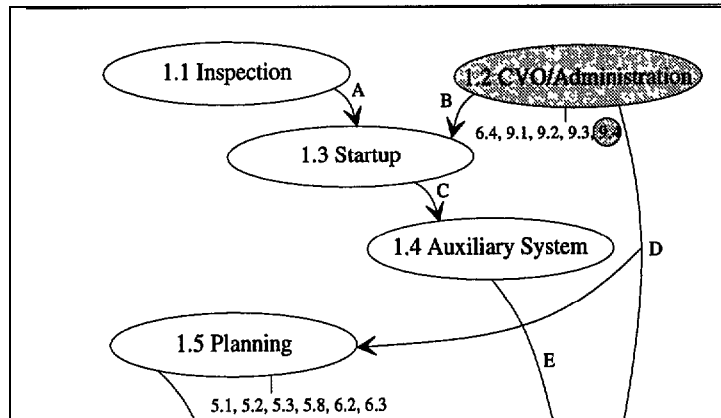
Summary An experienced interstate truck operator is passing between two States at nighttime. Prior to reaching the inspection point, her WIM system advises her to move to the right-hand lane, where her vehicle is weighed while traveling at normal speeds. Simultaneously, a sensor reads the truck's electronic credentials to validate safety records and debit the trucking company's account for road taxes. Finally, the driver's electronic credentials are verified to ensure that her driver's license and permits are up to date and that her operating hours have been within the legal limits. The driver receives notification that all transactions have been performed successfully, and she proceeds at normal speed past the inspection point.

Function Interaction Diagram See figure 51.

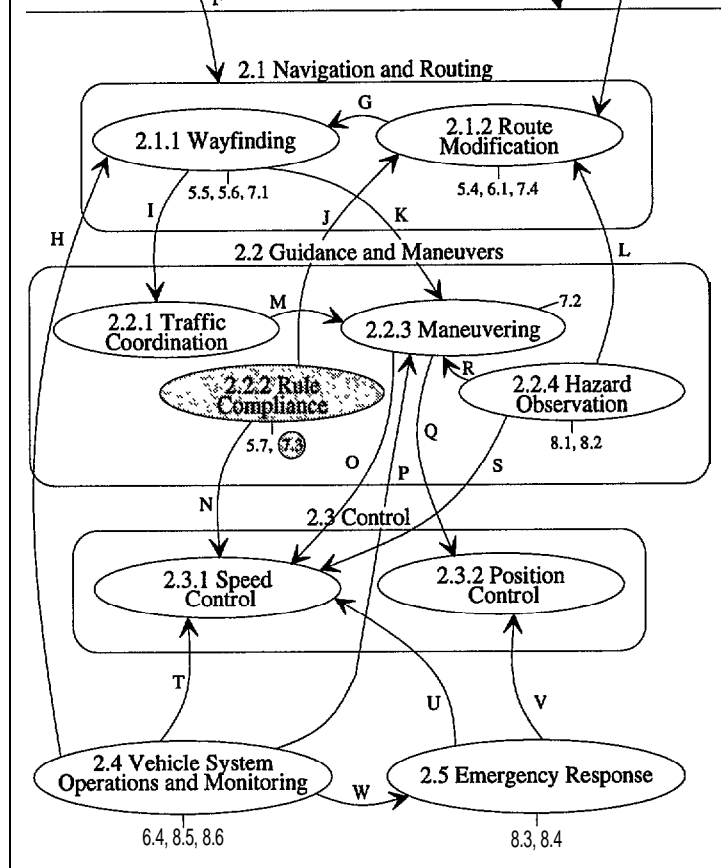
Operational Sequence Diagram See figure 52.

Task Characterization See table 66.

1. Pre-Drive



2. Drive



A Vehicle safety verified	I Maneuver required	P Failure requires change in speed/ lane position
B Paperwork completed	J Regulatory limits on roadway	Q Requires change in lane position
C Vehicle initiated	K Maneuver required	R Hazard identified
D Resource allocation	L Potential hazards identified in upcoming roadway	S Immediate hazard identified
E Auxiliary systems initiated	M Identification of safe path through traffic	T Vehicle failure
F Destination and route selected	N Deviation from regulations	U Conditions requiring immediate response
G Route change identified	O Requires speed increase/decrease	V Conditions requiring immediate response
H Vehicle service required		W Minimize injury/damage

Figure 51. Function interaction diagram for Scenario C11.

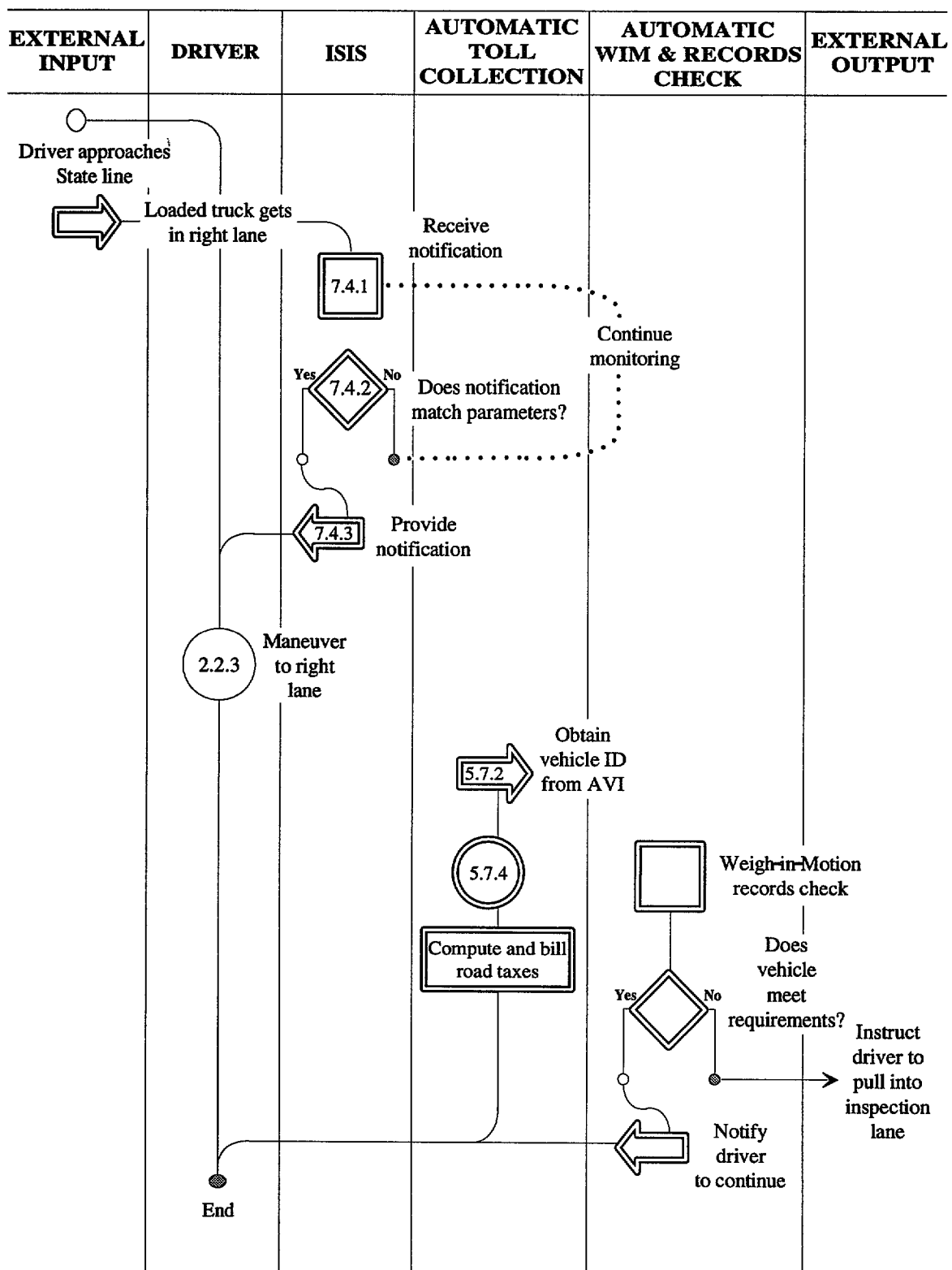


Figure 52. Operational sequence diagram for Scenario C11.

Table 66. Task characterization of Scenario C11.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
7.4.1	SYSTEM MONITORS CVO REGULATORY INFORMATION	Automatic system operation	Goal initiation	MONITOR		Automatic system action.
7.4.2	SYSTEM SELECTS CVO REGULATORY INFORMATION	Automatic system operation	System demand	TEST		Automatic system action.
7.4.3	SYSTEM PRESENTS CVO REGULATORY INFORMATION	Direct vehicle	Environmental change	CODE		Automatic system action.
2.2.3	MANEUVERING	Invoke system operation	Goal initiation	CONTROL	Requirements don't exceed driver's response capabilities.	
5.7.2	SYSTEM QUERIES VEHICLE FOR TOLL TAG OR AVI	Invoke system operation	Completion of previous step	SEARCH		Automatic operation.
5.7.4	SYSTEM INITIATES AUTOMATIC BILLING OR DEDUCTS TOLL	Invoke system operation	Completion of previous step	CONTROL		
END OF SCENARIO						

Scenario C15

Purpose To illustrate a grouping of functional characteristics from Cluster 5 (6.1, 6.2, 8.4, 8.5, and 8.6).

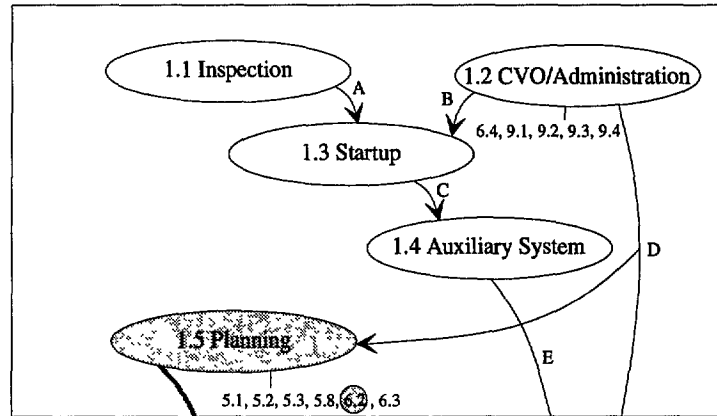
Summary An interstate truck operator is traveling on the interstate early Sunday morning. As he is driving, his “Cargo/Vehicle Condition Monitoring” informs him of a malfunction with one of the trailer’s axles. The driver pulls over, checks it, and determines that help is needed. Using the ATIS, he selects a service station that is open at that time and requests their assistance.

Function Interaction Diagram See figure 53.

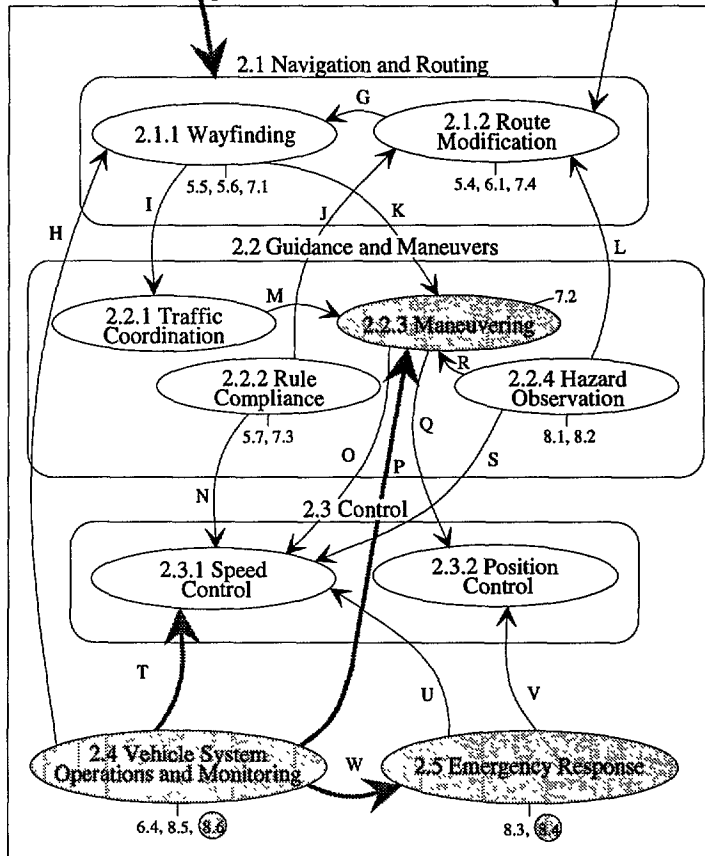
Operational Sequence Diagram See figure 54.

Task Characterization See table 67.

1. Pre-Drive



2. Drive



A Vehicle safety verified	I Maneuver required	P Failure requires change in speed/ lane position
B Paperwork completed	J Regulatory limits on roadway	Q Requires change in lane position
C Vehicle initiated	K Maneuver required	R Hazard identified
D Resource allocation	L Potential hazards identified in upcoming roadway	S Immediate hazard identified
E Auxiliary systems initiated	M Identification of safe path through traffic	T Vehicle failure
F Destination and route selected	N Deviation from regulations	U Conditions requiring immediate response
G Route change identified	O Requires speed increase/decrease	V Conditions requiring immediate response
H Vehicle service required		W Minimize injury/damage

Figure 53. Function interaction diagram for Scenario C15.

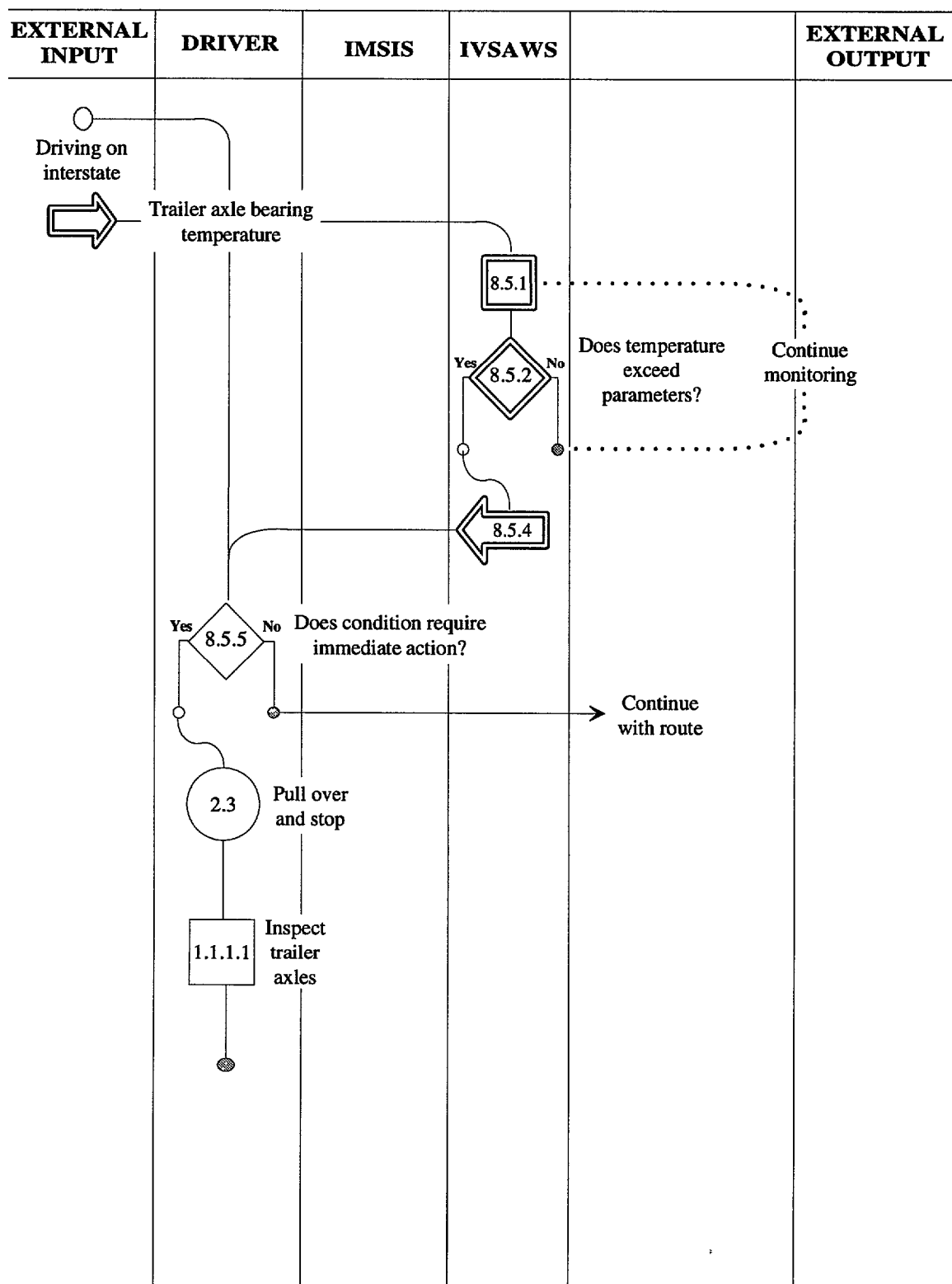


Figure 54. Operational sequence diagram for Scenario C15.

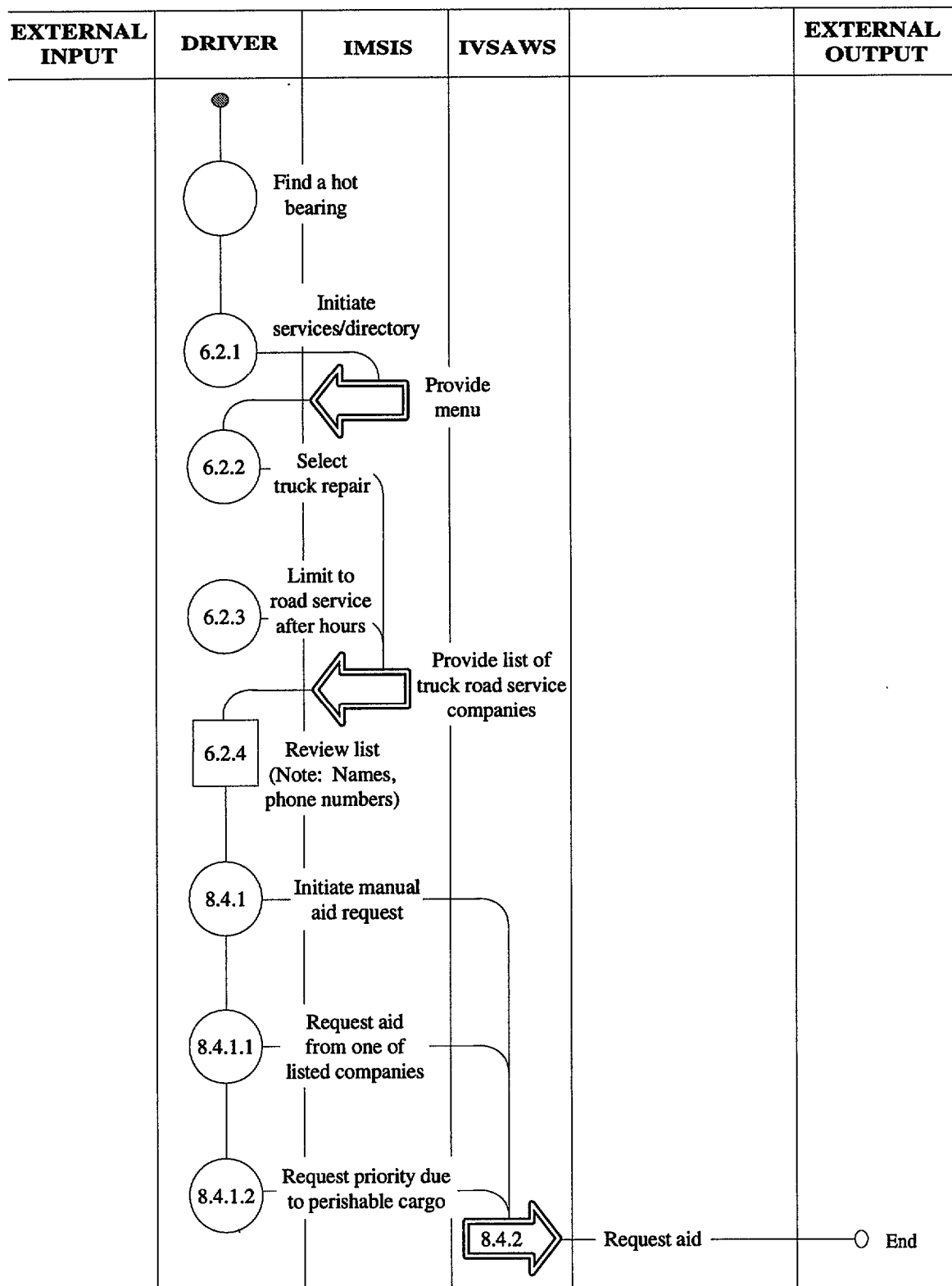


Figure 54. Operational sequence diagram for Scenario C15 (continued).

Table 67. Task characterization of Scenario C15.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
START OF SCENARIO						
8.5.1	SYSTEM MONITORS VEHICLE PARAMETERS	Maintain safe conditions (general)	System demand	MONITOR		Automatic system action.
8.5.2	SYSTEM DETECTS ABNORMAL CONDITION	Obtain system information	Environmental change	DETECT		Automatic system action.
8.5.4	SYSTEM PROVIDES DESCRIPTION OF PROBLEM	Obtain system information	Completion of previous step	CODE		Automatic system action.
8.5.5	DRIVER TAKES APPROPRIATE ACTION	Understand system/environmental information	Change of goals	DECIDE/SELECT		System must provide adequate information for user to predict outcome.
2.3	CONTROL	Invoke system operation	Goal initiation	CONTROL	Requirements don't exceed driver's response capabilities.	Pull over and stop.
1.1.1.1	INSPECT WHEELS	Understand system/environmental information	System requirement	INTERPRET	Information presented must be consistent with user's knowledge base.	

Table 67. Task characterization of Scenario C15.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
UNCODED DRIVER ACTIONS						
6.2.1	DRIVER INITIATES SERVICES/ ATTRACTIONS DIRECTORY	Make system ready to use	Goal initiation	CONTROL		System provides indication that the system is responding to input.
UNCODED SYSTEM ACTIONS						
6.2.2	SELECT CLASS OF SERVICES DESIRED	Limit system considerations	System demand	DECIDE/SELECT	Adequate information for user to predict outcome. Recommendations consistent with driver's experience. Recommendations don't violate known conditions or limitations.	
6.2.3	SELECT PARAMETERS FOR CLASS OF SERVICES	Limit system considerations	System demand	CODE	Input requirements compatible with user's knowledge. Input requirements directly.	

Table 67. Task characterization of Scenario C15.

REF #	FUNCTION OR TASK ELEMENT	PURPOSE	INITIATING CONDITION	DECISION ELEMENT	TASK PERFORMANCE CONSIDERATIONS	COMMENTS
UNCODED SYSTEM ACTIONS						
6.2.4	REVIEW LISTING	Obtain system information	Completion of previous step	SEARCH	Information presentation must not exceed short-term memory capabilities. Information presented must be consistent with user's knowledge base.	
8.4.1	DRIVER ACTIVATES MANUAL AID REQUEST	Invoke system operation	Goal initiation	CONTROL		(E.g., aid required, urgency.) System provides indication that system is responding to input.
8.4.1.1	AID REQUIRED	Make system ready to use	System requirement	CODE	Input requirements compatible with user's knowledge.	
8.4.1.2	URGENCY	Make system ready to use	System requirement	CODE	Input requirements compatible with user's knowledge.	
8.4.2	SYSTEM SENDS REQUEST AS WELL AS VEHICLE LOCATION	Automatic system operation	Completion of previous step	CONTROL		Automatic system action.
END OF SCENARIO						